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THE INDUSTRIALIST

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THE INDUSTRIALIST.

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ERRORS IN WAR HISTORIES.

JUDGING from the numerous demands coming from the G. A. R. for better and more accurate accounts of the late Civil War, our present set of text-books is wofully defective in this respect. It is quite possible this is true, though one would naturally suppose that such historians as the late Professor Johnston and Mr. Fiske, as well as Professor McMaster, could be relied on to get fairly near the truth, even in writing military history.

But what is it all worth, anyway, to the average student in our common schools, or even in our colleges? To be sure, if those things are to be treated at all, and some slight account may be necessary, they should be written as accurately as other portions of history. But why not practically eliminate from our text-books all but the barest outlines of our military history? The "fife and drum idea" of history ought, in these days at least, to be relegated to the rear and the student allowed more time for the vastly more important conflict of ideas. If it were necessary to vindicate the American soldier it might become more important to study this side of our history. Even then the study of the dry details of a campaign, which few not versed in the science of war could appreciate, would hardly be the thing for the pupils of our public schools. A simple narration of the life and deeds of some of our great military heroes would accomplish the purpose just as well. No doubt, by the way, there ought to be more of such literature in our public schools. It would serve the double purpose of inspiring patriotism and incidentally storing the mind of the pupil with information which he could turn to good account later in the more serious study of history. But for the average pupil in our public schools, of just what value is it for him to know the exact truth about McClellan's "being relieved during Pope's campaign?" How much better qualified either for the more serious study of history or for successful performance of all the duties of citizenship is he after he has reached a well-founded conclusion on the

question whether Grant did or did not "order any charge on Missionary Ridge," and whether "merely the left wing" or "no less than seven divisions belonging to the center and right remained with Thomas to the end" of the battle of Chickamauga?

The G. A. R. are naturally interested in such portions of our histories, because they participated in all those memorable scenes here alluded to. And surely to the extent that such matters are brought into our histories at all, they should be accurately dealt with, if only for the sake of teaching the habit of accuracy in all the details of history. But the contention here is that it would be far better to eliminate from our texts all but the merest mention of military campaigns and to devote the time thus saved to a more careful study of the development of "the inevitable conflict," and the tremendous results that followed from the adoption of the last three amendments to the Constitution, and similar questions.

C. E. GOODELL.

THE BRIGHT SIDE OF FARM LIFE.

TO THE man who exercises his brains along agricultural lines the word "farm," instead of being a synonym for drudgery, long hours, ceaseless toil and poor pay, reveals a life of intense interest. It carries with it the thought of home in the truest sense of the word, and not a temporary stopping place that one can rent for so much per month. This home is surrounded with improvements and comforts whose value cannot be measured in dollars and cents. A man permanently located on his own property can take a just pride in having things arranged conveniently and in a manner to suit his own tastes.

The isolation of farm life is fast becoming a feature of the past. The telephone is rapidly pushing itself into the rural districts, and at the low cost of one dollar per month the farmer can talk with his neighbor, with friends in town, and even converse with those in distant towns and cities without leaving his own house. At a recent institute in Osage county the very successful program presented had been arranged almost entirely over the telephone. The rural delivery is also bringing the farmer into close touch with the outside world. At a farmers' institute in Jewell county the writer dined at a farm house eight miles from town. The mistress, while explaining the conveniences of the telephone, told among other things how she could order her gro-

ceries over the telephone in the morning and have the mail carrier deliver them before dinner the same day.

On the farm the living expenses are reduced to a minimum. Fresh vegetables, fresh eggs, chickens and various kinds of fruit are always available in their season, and many of them last throughout the year. While attending a farmers' institute at Overbrook, Kan., the writer was served with some as tender and juicy meat as has often been his privilege to taste. Inquiry revealed the fact that this meat was from a young animal that had been raised and slaughtered on the farm. While Kansas produces large quantities of this kind of meat, it is seldom consumed on Kansas tables, but shipped to eastern markets. To fully appreciate the generous quantity and the excellent quality of the living on the farm, one has only to live in the city for a short time, where every mouthful one eats means so much cash out of his pocketbook. What appear to be large salaries to those whose living comes largely from the farm, with but little cash outlay, dwindle into rather insignificant sums when rent, grocery and meat bills are all paid.

Again, the work on the farm has a lively interest to the man who has the brains to appreciate it. The effect of a soil mulch in preventing the evaporation of moisture; the effect of packing the subsurface; the discing of alfalfa to thicken the stand of this valuable plant and at the same time kill the weeds and destroy the insects; noting the number of stalks of corn that produce first-class ears in a given area and cutting off the tassels from the barren stalks to prevent their transmitting a tendency to barrenness in successive crops; watching the calves grow, the steers fatten, and the cows give milk; noting the differences in individuals, and hundreds of other things that might be mentioned, all contributing their share to make farm life interesting, instructive, and profitable.

In the mad rush for the dollar we are apt to overlook the true mission of the farm by overwork. Perhaps an illustration will best show what is meant. While assisting in a farmers' institute at Marysville, Kan., the writer was invited to remain over night with Mr. L. Scott, an ex-county superintendent of Marshall county. Mr. Scott is working only ninety acres, but he believes that the farm should, as far as possible, produce all his family needs, and accordingly has a fine apple, peach, pear and plum orchard, to-

gether with an abundance of small fruits and strawberries. A garden near by contains all the fresh vegetables that the housewife could possibly use.

Mr. Scott believes in getting all the comfort and enjoyment that it is possible to get out of life. He does not overwork, and for this reason has time to spend with his family. When a holiday comes he sees that the chores are done and then he celebrates. Mr. Scott says he is not getting immensely rich, but he is getting lots of satisfaction out of his farm. He has plenty to eat, plenty to wear, and plenty of time to read and enjoy himself with his family. What more does a man need? Such a life is worth living. We need more of such spirits among our Kansas farmers.

D. H. OTIS.

NEW ENGLAND FARM HOMES.

AMONG the things that New England is famous for is her farm homes and the many strong men and women who have gone from those homes and have played an important part in the development of the West. To one who is transplanted from the West into one of the "hill towns," that is, a township somewhat remote from the industrial centers, the quaint, substantial, though often deserted appearance of the old farm homes makes a strong impression. As a general rule, the old farm houses are rather low, a story and a half, with a long, sloping or perhaps hipped roof, from the center of which emerges a large, low chimney, often built of stone. This chimney is one of the most important features of these old houses, not only for its use, but for its size, for its beginning in the celler is a base sixteen or eighteen feet square, on the first floor it is narrowed to about twelve feet square, and on three sides is found a large, old-fashioned fire-place, and beside one of the fire-places a brick oven. In the upper story, if there be rooms to warm, smaller fire places are built. Attached to the rear of the house is a low kitchen, and back of that a wood-shed, which often connects the house with the barn, and in this region of long continued and deep snows is often a great convenience, as it affords a passage to the barn without going out in the snow.

In many of these old houses, built under the hills, a spring is piped from the hillside into a spring tub in the kitchen and affords an abundance of pure, soft water throughout the year. Where houses are not so conveniently situated, water is obtained from

an open well by means of the old-fashioned well sweep. About the house are usually found magnificent old elm, maple or chestnut trees that not only add to the beauty of the place, but afford excellent protection from the storms of winter and the summer sun.

Most of these old houses have been built for a hundred years, and some of them for two centuries, and in most cases are put together with hand-forged nails and wooden pins. Many of these old homesteads are deserted or occupied by foreigners. Of the families that built or lived in them, the old people have died and the younger members gone to the cities or to the West, where opportunities for making money are greater. There appears to be, however, a stronger attachment for the home and farm, poor as the latter often is, than is usually observed in the West.

It is possible to buy some of these old and so-called "abandoned" farms for a small part of the actual cost of the buildings, and in most of the back hill towns farms are much cheaper than they are in Kansas; but the cost of digging, blasting and hauling away the rocks from the fields and of supplying fertilizers to the impoverished soil often makes one of these cheap farms very costly by the time it is brought into a fair state of tilth and fertility.

While New England cannot offer great inducements in the way of money-making on these hill farms there are many other advantages. It is a fine fruit country, and especially in the southern part, and the climate is excellent. The scenery is beautiful and the close proximity to seashore, mountains and the large cities offer many opportunites for real enjoyment in living. One who has lived there can imagine how homesick the early settlers on the prairies of the West might have been for a glimpse of the old homestead among the hills, rocks and brooks of quaint old New England.

N. S. Mayo.

DON'T WORRY.

THIS subject was not suggested, as might be supposed, by the recently formed "Don't Worry Club" at K. S. A. C., but by the assertion of a leading magazine that "many of the cases of suicide are to be accounted for by an apprehension of future trouble rather than an experience of present distress." That is to say, if we interpret rightly, men are far more inclined to kill themselves because of ills which are imaginary and intangible than for those which are existing and real.

There is a suggestion in this magazine's view that is worthy of our consideration. Granted that the majority of mankind are not so rash as to commit suicide, still a large number are unquestionably disposed to borrow trouble. The student worries over the lessons to be learned, the tasks to be accomplished, the duties to be performed; the farmer "frets and stews" of too much rainfall, then again when the weather is too dry and dusty, while the broker watches the stock exchange with bated breath and palpitating heart. Prosperity brings its worries and cares just the same as adversity does; the present is crowded with problems to be solved while the future is veiled in misty obscurity—in truth, people bother themselves in a very foolish fashion about a thousand things that are, at the most, but trifles, and that will regulate themselves if one could only be patient and let them alone. It is not so much what men know as what they fear that keeps them on the rack of torment.

Granting that the chronic fretter is the one person in all the world whom we would wish, with all his numerous relations, suddenly and miraculously transported to the Isle of Nowhere, still after all is he not more of a detriment unto himself than unto those with whom he must necessarily come in contact? "The face is the index to the soul," and no one can live and move and have his being in this unpleasant personal atmosphere for any great length of time without having the inward ferment indelibly stamped upon his features, and it is for this reason that he is more to be pitied than those about him. The ugliness recoils on his own head, while it glances from all others against whom it may be directed.

I have heard persons affirm that this habit of worrying was hereditary—oh, the number and varied sins this one poor, much-abused cloak must cover—hence with them the habit was a constitutional weakness for which they were no more responsible than is the tree for the thorns and bitter fruit that it bears. Poor deluded mortals. With others the habit is acquired simply by allowing the trifles of every-day life, business or domestic, to irritate and annoy them beyond the limited power of endurance. Nobler by far would it be to do one's very best, then instead of worrying and fretting cast aside these perplexities as being unworthy a moment's consideration; but on the contrary how different it all is.

Fretting, by over-indulgence, grows so rapidly and with such energy the day is not nearly long enough to bring satisfaction, hence when the goddess, sleep, should claim the victim for her own the surcharged mind is still busy with the duties left undone or to be done. At last, in sheer desperation, the dream god seizes the shuttle and continues the weaving of the intricate pattern, till the little sunbeams summon the already tired body, exhausted brain and weary nerves to active duty and renewed worrying.

Children, always very susceptible to example, slip into the habit as naturally and becomingly as a duck into the gurgling waters of the little brook: consequently the little toddlers can hardly lisp their broken sentences till their education in this, as in many other lines, not only equals but is superior to that of the parents. Delightful family of fretters these, and valuable addition to society!

Now, whether this habit of worrying be heredity or acquired, whether the victim claims responsibility or irresponsibility for its existence, it can be mastered, if not entirely conquered, by a determined effort on the part of the unfortunate possessor to overcome it. Weed it out, as it were, and cultivate in its stead a happy, cheerful and contented disposition. True it is difficult, very difficult; but so is progress along any line.

If yesterday is, as Thackery declares, the philosopher's property, then to-morrow also belongs to that serene and excellent personage. Let him take them both and make of them what he can while we devote ourselves to the day that is, measuring its lights and shadows, its opportunities and hindrances, by what we see and understand, not by what we suspect and imagine. Nothing is ever quite so bad as it seems, even when at its worst; and things at their worst are little mended by the gnawing process of worrying.

A story is told of a man who, hearing another pacing the floor disconsolately because he could not pay a bill coming due on the morrow, cooly said to him, through the thin partition: "Go to bed, my friend, and let the other fellow do the walking." This same advice is applicable to most instances of mental torment. If we cannot pay our bills, we gain nothing by murdering sleep with painful and futile repinings.

"Life is what we make it." The secret of content, as of happiness and success, is largely a matter of good humor. Sidney Smith

was right when he said "a smile is worth more than a groan in any market." The clouds part for those who wear bright and confident faces; fortune is unmistakably on the side of those persons who cultivate the habit of "looking on the bright side," for a bright side there always is, let the prophets of gloom and storm say what they may. This world is not a "vale of tears" unless we choose to make it thus by our own folly and weakness. It was designed for kindlier and better uses, and the fault is ours if we do not make our stay here a satisfaction and delight. Then, if we possess this good quality of content, let us unveil it, that it may shine throughout the world, that we may scatter sunshine where only clouds and shadows reign, and thus fill the atmosphere where earth's weary fretters must stand with a brightness which they cannot create for themselves, and which they long for, enjoy, and appreciate.

ALICE RUPP.

THE EXPERIMENT STATION ON THE FORT HAYS RESERVATION.

THE Congress of the United States, in an act approved March 27, 1900, ceded the Fort Hays military reservation, containing some seventy-six hundred acres, to the State of Kansas on condition that it would establish and maintain there a branch of the State Normal School and of the Agricultural Experiment Station. The State legislature, in an act approved Febuary 7, 1901, accepted the reservation. Later an appropriation was made of $5,000 per annum for the next two years for the Normal School, and $3,000 per annum for the same period for the Experiment Station. Previous to the passage of the act of Congress ceding it conditionally, a report became current, without authority, that the reservation was open to settlement, and a considerable number of persons made homestead entries. These occupants have been contesting the title of the State to the reservation. At the meeting of the Board of Regents in December, it was decided that, in order to get possession of the land before another season, it would be best to compromise with the occupants, giving them leases of from two to five years duration in exchange for complete relinquishment of claims to the land. These compromises have been effected, and a considerable body of land remains available for experimentation. In the division of the land between the Normal School and the Agricultural College, the latter obtained about

thirty-five hundred acres, including the parts most desirable for agricultural purposes.

The Board of Regents adopted the following resolutions in respect to the management of the Station at Fort Hays: (1) That the President of the Board of Regents shall appoint a Regent who shall, under the direction of the Board, have special charge of all matters pertaining to the Fort Hays reservation in behalf of the Agricultural College, the Experiment Station Council to direct all experiments, subject to the Board. (2) That the crop experiments, and such other experiments as can be provided for, be begun in the year 1902 on as liberal a scale as circumstances and the funds at our command permit, and that all seeding, cultivation, harvesting, storing, sale and purchase of commodities, or of live stock, and its feeding pertaining to experimental work, and all records in reference thereto be under the immediate supervision and direction of a competent man, who shall be stationed at Hays so much of the time as may be necessary for best doing the work contemplated. (3) That such repairs be made upon the buildings on the Fort Hays reservation as shall make them available for use, and that a practical farmer be employed, who shall be known as the foreman of the farm, and who shall see that all contracts pertaining thereto are fulfilled, and all property belonging to the Experiment Station is properly cared for, and shall perform such other duties as may be assigned him. (4) That the Regent appointed to have charge of the interests of the Experiment Station at Hays shall be paid his per diem, and actual and necessary expenses incurred in the performance of such duties, but shall not be allowed mileage.

The Station Council has not yet decided upon the details of the experiments to be undertaken, but they will include thorough-going trials on a large scale of crops and methods, with special reference to the needs of regions with deficient rainfall. A section of land will be broken as soon as the weather permits. Situated west of the ninety-ninth meridian, the Station will occupy a field entirely different climatically from that of any other station in the country, and the results obtained there ought to benefit a large region, extending even beyond the boundaries of the State.

J. T. WILLARD.

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PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

Professor Remick was under the weather and unable to meet his classes for several days last week.

Sub-contractor Van Dorp, of the roofing work of the new Physical-Science building, received the slate material this week.

The cast-iron sash weights for the new Physical Science Hall arrived this week from the John Seaton foundry in Atchison. They weigh about five tons.

The *Farm Journal* publishes an illustrated article of an improved hog trough invented by student Schowalter, of the farmers' short course. The device is simple and practical.

Doctor Mayo was called to Wichita last Tuesday and Wednesday to attend a meeting of the live-stock sanitary boards of Missouri, Colorado, Oklahoma Territory, Texas and Kansas that was held in conjunction with the meeting of the Oklahoma Cattle Growers' Association.

This week the second-term farmers' short-course students finished their work in farm architecture, under Professor Walters. They will now take up dairying at the first hour. Professor Walters speaks of the class as one of the most earnest and intelligent he ever instructed.

The library has just received a consignment of over fifty new and valuable books. One of the most valuable works received is a Dictionary of Architecture, in three large volumes, published by the MacMillan Company, New York. The work is illustrated with several thousand fine engravings made especially for this purpose.

President Nichols was at Topeka on College business last Monday. He also acted as a member of a committee of four, appointed to investigate the work of the Quindaro colored school at Kansas City. Quindaro has made application to have its graduates accredited with a part of the work required of candidates for State teachers' certificates.

During the month of January the Dairy Department received 1940 pounds of cream directly from patrons and 2059 pounds from skimming stations. It paid for butter fat, exclusive of the quantity produced by the College, the sum of $388.16, *i. e.*, at the rate of twenty cents per pound. The amount of butter made was 4422 pounds, nearly all of which was sold in the New York market, where it brought top prices.

Miss L. M. Helder announces that owing to the fact that Mr. King will be detained two weeks longer at the University of California and at Leland Stanford, she is forced to postpone the date of her recital until Monday evening, March 3.

The student delegates from this College to the general assembly of the Y. M. and Y. W. C. A. of America, at Toronto, Canada, next week are Miss Florence Wilbur and Mr. W. B. Banning. They will start for the assembly next Monday morning.

The Faculty were entertained at Professor and Mrs. Willard's last Wednesday evening. A top-spinning contest soon set tongues to spinning in harmony with the tops. The interest in these parties increases with their frequency. After dainty refreshments and more conversation the members, with best wishes for host and hostess, reluctantly separated.

There will be some hard-fought contests in the Dairy Department during the Dairy Association week. Spectators will hear no noise nor see blood and bandages, as is the case when athletes go on a rumpus, but practical people will follow the course of the program with interest all the same. Eight of the dairy students will contest with each other in butter making, eight in butter scoring, eight in judging dairy cattle, and eight in skimming-station work.

This week will be "Poultry" week at the Kansas Agricultural College. There will be speeches on chickens, essays on ducks, orations on turkeys, poached eggs on toast, and other entertaining and delicious morsels. The week is to be in the nature of an institute, and all the lovers of poultry, alive and dead, are requested to come up to Manhattan and take advantage of the opportunity to learn something about the feathered tribe. This invitation, of course, includes Methodist preachers.—*Drovers Telegram.*

Maj. Henry E. Alvord, chief of the dairy division of the department of agriculture, has accepted an invitation to attend the State Dairy Association, which meets at this College March 4. Major Alvord is a man of broad culture and is known as an agriculturist all over the country. He has a brilliant war record, and for several years after the close of the civil war was in the regular service, and at one time was stationed at Fort Riley. He will give two stereopticon lectures on "The Paris Exposition and a Trip Through Europe."

Engineer Jacob Lund has been very busy—he always is—during the past two or three weeks with the construction of the heating apparatus of the large stock-judging hall at the old barn. The hall was built last summer at considerable expense. It is forty-six feet wide by ninty-three feet long and reaches to the roof, which is provided with sky-lights. The seating capacity is about two hundred fifty, with a large arena at the center for the farm animals. The whole room will be comfortably heated by steam from a boiler in the barn basement.

The first monthly meeting of the Manhattan Horticultural society of 1902 will be held in the Horticultural Hall at the Agricultural College, Thursday, February 20, at 2:30 P.M. The program is as follows: "What is the Experiment Station Doing and What Does it Purpose Doing for Horticulture?" Albert Dickens; "Fruit Trees and Fruit Bearing Plants from the Position of the Landscape Gardener," T. C. Wells; "Varieties of Fruits and Vegetables Best Adapted to this Locality," George Greene. Reports of committees on fruits, flowers and vegetables. Discussion of papers. Question box.

President Nichols and Professors Willard and Cottrell went to Hays City on Friday afternoon to inspect "our new western possessions" and select a tract or tracts for experimental planting when the season opens. The College expects to go at this work with energy and perseverance as soon as the frost is out of the ground. The only regret is that the available funds are too meager to accomplish all or even a good part of what ought to be done To place the whole four thousand acres under high-grade culture and to provide the necessary fences, sheds, stables, barns, buildings, roads and water supplies will cost the institution between $50,000 and $100,000, while the available amount is only $6000.

It seems that Manhattan is unable as yet to build a paved street between the business part of the city and the College, but it might provide some street lights. There ought to be about five or six electric lights placed along the main traveled route between the high school building and the College gate. The College authorities would undoubtedly meet the efforts of the city by adding a light or two between the entrance to the grounds and the Main building, thus providing for a well lighted avenue from the railroad depots to the College. A move of this kind would place the whole student body, the Faculty and every friend of the institution under lasting obligations to the city dads. Let there be light!

The program for the annual meeting of the State Dairy Association, to be held at this College, March 4 to 8, has not been completed as yet, but Secretary T. A. Borman has announced the following preliminary items which it will contain: Maj. Henry E. Alvord, chief of the dairy division, bureau of animal industry, department of agriculture, will give a stereopticon lecture on "Notes Upon Dairying in Europe." Dr. Henry Wallace, editor of *Wallace's Farmer*, will speak on "Pastures." Euclid N. Cobb will give two addresses. Prof. G L. McKay will talk on "Butter." H. D. Watson will state "Experiences with Alfalfa." Prof. Edith McIntyre will speak on "Uses of Dairy Products in Cooking." J. E. Nissley will relate his "Observations Taken on a Trip Around the World." Prof. E. B. Cowgill, editor of the *Kansas Farmer*, subject, "Relative Value of Feeds." F. L. Huxtable, "The Skimming Station Operator." Prof. H. M. Cottrell, "How Profits in Kansas Dairying may be Doubled." Prof. Edward H. Webster, "Pasteurization and Its Value to Kansas Creameries." Prof. E.

W. Curtis, "The Hand Separator Proposition." Prof. D. H. Otis, "The Dairy Student After He Leaves College." Exhibits of butter, cheese and dairy machinery. The College orchestra will furnish music for the meetings.

The press of the State has said so many good things about the College since the editorial association two weeks ago that we are unable to repeat even a small part of it. The following lines from the Le Roy *Reporter* is simply a sample: "The visit to the College on Tuesday morning and what they saw there was a revelation to those who had never seen those sights. In spite of the zero weather the boys of the battalion were out in full force and going through their various evolutions. The cannon boomed the customary salute to the governor of the State. who was present. During chapel exercises as many of the editors as could be accommodated were given seats on the platform. An editor, ripe in years, who has seen much of the world, told the writer that as he looked into the open faces and bright eyes of those fourteen hundred students, packed closely in the seats and aisles of that stuffy chapel, his soul filled with unbounded confidence in the future of this great State, mixed with pride and a little shame that not a more commodious auditorium had been provided for that magnificent student body. With many editors it was their first visit at the College. To them it was a revelation. The most prominent citizens of Manhattan, together with the Faculty and students, did their best to show their guests a good time. Every department of that great institution, the library, museum, Domestic Science Hall, shops, foundry, stables, fine stock, dairy building, green-house, etc., were carefully inspected. . . . The farmers of Kansas, or in fact the citizens in general, do not know what a great institution for their boys and girls they have at Manhattan. It is a State and national school, supported by both and conducted by the State under national laws. Stock men and dairy people should familiarize themselves with its work. Parents should investigate the merits of this College before sending their boys and girls away from home to get an education. . . . Manhattan is a clean town, morally and physically, and a good dwelling place for boys and girls during their years of study. There is good society, good churches, and every facility for moral and religious training. . . . Every editor who was at Manhattan last week will be at Topeka next winter during the session of the legislature lobbying for appropriations for the College. An auditorium is badly needed, also more modern presses and other printing and binding appliances for the Printing Department. That department is badly crippled for want of material and modern machinery. . . . The editor enjoyed the hospitality of his friend, Prof. J. D. Walters, and his estimable wife, at their pleasant home. The professor comes from Switzerland, the rocky-mountain region of Europe, and true to his natal predilections built his home at the foot of and against one of the hills that surround the townsite of Manhattan. From the door of his home he has a fine view of the city and surroundings."

POULTRY WEEK,

Kansas State Agricultural College, Manhattan, Kansas, February 17 to 22, 1902.

JUDGING.—Judge C. H. Rhodes, of Topeka, will give instruction every afternoon in scoring and judging poultry. A large number of chickens of the leading breeds will be loaned by Manhattan fanciers for the work.

MORNING SESSIONS.—Each forenoon will be devoted to a Poultry Institute, with papers, addresses and discussions by leading poultrymen of the State.

PROGRAM.

Artificial Incubating (illustrated by three incubators hatching), - - - - - - - - - Mrs. J. W. Pinkerton
Clay Center.

Hatching with Hens, - - - - - - - Capt. J. T. Smith
Manhattan.

From Eggs to Market, - - - - - - Judge L. P. Harris
Clay Center, Neb.

Brooder Chicks, - - - - - - - - - - - W. A. Lamb
Manhattan.

Raising Chicks with Hens, - - - - Mrs. S. Koppenhaffer
Manhattan.

Feeding for Exhibition—From Shell to Judge, Chas. Steinberger
Wa Keeney.

Intelligent Poultry Feeding, - - - - - - H. E. Moss
Kansas City.

Feeding for Winter Eggs, - - - - - - - Alex. Howell
Manhattan.

A Woman's Experience with Chickens on the Farm, Mrs. J. T. Heil
Wamego.

The Hen, - - - - - - - - - - - Thos. Parker
Hutchinson.

To what Extent can Poultry Raising be made Profitable on the Farm, - - - - - - - Mrs. A. J. Pottorf
Riley.

Fattening and Marketing Poultry, - - - - James Herbert
Manhattan.

Fitting for the Show, - - - - - - - - M. L. Canfield
Belleville.

Breeding and Mating, - - - - - - - - - C. C. Smith
Topeka.

Poultry Diseases, - - - - - - - - - - S. J. Norton
Manhattan.

Moulting, - - - - - - - - - - - - - B. W. Smith
Manhattan.

Chalk Talk, - - - - - - - - - Prof. J. D. Walters
State Agricultural College.

Poultry Accessories (illustrated with model appliances in actual use), - - - - - - - - - - Dr. S. D. Ross
Manhattan.

Raising Turkeys—From Eggs to Market, - - J. R. White
Salina.

Raising Water Fowls, - - - - - - - - H. E. Moss
Kansas City.

Question Box, - - - - - - - - - - Geo. H. Gillies
Editor *Illustrated Poultry Gazette*.

The Question Box will be opened at each session and you are invited to ask any questions on poultry raising upon which you wish information.

All the work of the entire week will be free, and every one interested in any way in poultry is invited to attend.

Exhibits of incubators, green bone cutters, nests, feeds, poultry fencing, etc., etc.

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THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE
AGRICULTURAL COLLEGE

☆ ☆ ☆

Editor-in-Chief,	*Pres. E. R. Nichols*
Local Editor,	*Prof. J. D. Walters*
Alumni and Former Students,	*Prof. J. T. Willard*

☆ ☆ ☆

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THE INDUSTRIALIST.

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CLASSIC STUDY.

THE term classic, as we use it in English, means literature that is acknowledged as taking first rank; literature containing valuable thoughts given in a style showing proper distinction and dignity. As each writer has his own manner of expressing himself, we will find as many styles as there are writers, but in all cases there will be harmony between the thought and the style if the work is a classic. This makes a classic stand the test of time and criticism, and be pronounced good.

There should be a distinct line drawn between what we call classics, and what we term good reading. The former we enjoy studying, the latter we read only for recreation and enjoyment. Much of the so-called "modern fiction" belongs to this latter class. Take out Howells, Mark Twain, and the works of a few others, and the fiction of to-day is only wholesome and enjoyable. The lecturer who said he tried to read only classic literature and who depended on the reading public and the critics to select the new books for him, might make a mistake in choosing from their lists. The critics will never agree as to the merits and demerits of a book, and the reading public is made up of many peoples of many minds. Scores of books are intended to be read only in part, while others are to be read carefully and thoroughly, and as readers we need a little of both kinds.

The classics belong with the books Bacon says are "to be chewed and digested." To get all the beauty out of them requires many readings. It means more than reading; it means literally picking them to pieces. Just as the botanist becomes more interested and sees more beauty in the flower after carefully pulling it to pieces and studying every detail under a magnifying glass, so the student by thoughtful, critical study will find in a poem, an essay, or a story, beauties not dreamed of by once reading. Every classic thus studied helps the reader to a higher plane of thought. It gives him a fountain from which to draw; it

furnishes material for future thought. We are not satisfied unless we are required to put some mental effort on what we read, and take from it something to consider. Classic study does this for us. It is said the study of Shakespeare marks a period in the intellectual life of every student. There are many reasons for studying classics. It creates a taste for good reading. The young student does not know how or what to select to read. The amount of reading bewilders him. He looks around and is unable to decide what to take up first. Unless he has had some training as to what to read and how to read, he decides on the twenty four paged newspaper and reads only the headlines. The reading of headlines for articles is a pernicious habit many of us have fallen into. We need to be on our guard against it. We would not be understood as criticising the reading of our daily papers, but we read these as we read a letter from home—to get the news. This should not mark the horizon of our literary zone. Classic study is good discipline; it helps the student to select his reading; it breaks up careless and irregular habits by teaching him to read thoughtfully, and earnestly.

The student comprehends words by critical study. This is the only way the vocabulary can be strengthened and enlarged. To talk well means a proper use of words. Fluency and directness of speech always mark the cultured man. It matters not where we are placed in life, behind the plow, the counter or the desk, the ability to talk well gives us a place among men. In many instances it has marked success or failure. Many of our classics are written in plain, simple, Anglo-Saxon language; home scenes where the cottage is transformed into a palace; stories that come very near to all of us. Wordsworth and many of our best poets are really great on account of the simplicity of their language. When writers want to bring home truths to "men's business and bosoms" and convey the more subtle shades of thought, classic derivatives are used. In detail work in classic study, words, phrases, and whole clauses present themselves so forcibly to the reader that in time the word forms in the literature he reads unconsciously become his own.

While laying stress upon minor points, we would not for a moment lose sight of the fact that the main object of study is to get the *thought* of the writer. Milton says "a good book is the life blood of a master spirit." A thought is truly a living thing.

When we are able to see the mind of the writer, and communicate with him through his works, we are able to get what there is out of a classic.

The ethical principle is clearly marked in all good literature. Every classic preaches its own sermon. Evade this principle as much as you may, it is always there. It is the principle for the novelist, the dramatist and the poet to work upon. It is the foundation upon which all that is good in literature is built. We would not sacrifice picturesqueness and art to make this prominent in our study, but study cannot be beautiful without it. Shakespeare taught a lesson in every tragedy, Hawthorne in every novel, while Browning in his poetry is not unconscious of it. The student cannot help but be made better by studying classics. In no field of investigation do we find so much that is valuable to the student himself as in the field of literature. It pays to put time on the study of great lives and great works. It means more thoughtful and better men and women. This truth has passed into a literary axiom. Let me write the *books* of a people and I care not who writes the laws.

MARY E. BERRY.

A PLANTER'S NOTES ON TREES AND SHRUBS. II.

HIBISCUS SYRIACUS, Althæa or Rose-of-Sharon. A common and valued hardy shrub with flowers like the hollyhock, though smaller, and in single and double forms, varying in color from pure white through rose to bluish purple. The leaves are more or less three-lobed and of a grayish-green color. The flowers are produced from midsummer to early autumn, and in all but the blue-purple shades are of agreeable colors. Beside the self-colored varieties, there are white flowers variously centered and striped with the other shades, some of them very pretty. Among the best are the single pure white, the white with deep red center, and among the double forms, white with rosy center, white with rosy stripes, and the double white, rose, and red. Unless the double blue and purple shades can be selected while in bloom, they had better be rejected, as some very poor colors are sold under these descriptions.

A form with prettily variegated leaves is one of the best of shrubs of its class, the growth being satisfactory, and the variegation well retained throughout the season. The flowers in this form are small, deep reddish-purple, full double, but do not usu-

ally open fully in our dry air, and consequently do not materially add to the beauty of the plant.

The althæa is a good grower in almost any situation, though it responds fully to proper surroundings and good soil.

Tilia americana, the native linden, basswood or linn-tree, is one of our most characteristic and beautiful trees. Preferring the deep rich loam of the lowlands, it will make a satisfactory growth in any but the poorest and driest soils, and has as few undesirable characters as any tree commonly planted. Its habit is rather formal, the leaves are large, of a healthy green color, and retain their beauty throughout the season. When the tree is in bloom it is especially attractive not only to bees but to tree lovers as well. The smooth, clean bark upon the trunk and branches gives it a distinctive value even in winter. With us its chief weakness is a tendency to sunscald on the southwest side of the trunk, where too greatly exposed, a danger to be easily avoided by retaining the lower branches until the tree is well established.

Tilia heterophylla is a species also hardy with us, but scarcely to be distinguished by the planter, the difference being mainly in the silvery-downy under surface to the leaves.

Tilia europaea, the European linden, proves only a partial success in this locality. Its chief disability is a strong tendency to sunscald, or injury to the southwest side of the trunk in exposed situations, almost surely resulting in a deadening of the cambium, which the tree never outgrows. While its foliage and habit give it an agreeable character by way of variety, it cannot be recommended for planting in situations similar to ours.

Xanthoxylum americanum, the native "prickly ash," is an interesting shrub in several ways, not the least of which is its aromatic foliage and fruit. The leaves take good colors in autumn, and when covered with its dull-red berries the plant is not unattractive. But except in large plantations, where it may be used in copse effects, it had better be omitted entirely.

Phellodendron amurense, the Siberian cork-tree, though esteemed a hardy tree in most parts of the eastern United States, has proven disappointing here, the special difficulty in its growth being apparently an inability to withstand the unfavorable influence of dry, hot August weather. The consequent low vitality of the tree results in winter-killing, more or less complete, and of many specimens planted here not one acceptable one remains.

In moister soil and a more protected situation it is less injured.

Ptelea trifoliata, the wafer ash, is a low growing, irregularly branched tree with dark bark, its leaves of a yellowish green, and its broad, winged seeds in clusters. This species is hardy with us, and has been planted, for the sake of variety, in some neighboring lawns. It is here much affected by a small leaf hopper, which in all stages inhabits the lower side of the leaf, sucking the juices and spotting the leaf with yellow. For this reason, and for the reason that there are many more suitable trees, this species is undesirable in small grounds.

Citrus trifoliata, the Oonshiu orange, has been largely advertised as a hardy orange by the nurserymen. Though surviving the winters in the Eastern States in the same latitude as ours, it has been found to be absolutely tender here, and its planting will bring nothing but disappointment.

Ailanthus glandulosus, a native of China, has been amply tested in Kansas, and has generally proven hardy. Its large pinnate leaves have a tropical beauty, and in its rapidity of growth it is excelled by few species. The trees are of two kinds, the stamen-bearing less desirable, as the flowers of this kind are very disagreeably odorous. The fruit-bearing tree is much the less objectionable and when full of its large clusters of broad-winged, red-tinged seeds, it is a striking object. The marked habit of sprouting, developed as the tree reaches size, and increasing except where carefully controlled, forms an objection to the species in lawn planting, though many are not willing to forego the beauty of the foliage on this account. A favorite method of treatment is to grow the tree under a system of repeated cutting back, the growth of previous season being removed to the crown each spring. Strong young sprouts arise with immense leaves, superior in a decorative way to the foliage of any other plant in our list.

Ilex aquifolium, the European holly, has been tried sufficiently to determine its inability to grow in this climate. Where it succeeds its rich evergreen leaves and bright, red berries make it a very attractive plant. As with most of the broad-leaved evergreens in our climate, the dry, clear, cold of our winter weather is destructive to the health of the tree, and if not killed outright it drags out a miserable and unsightly existence until removed by death.

Ilex decidua, another species, not evergreen, and native to the Southern States, has proven too tender for this climate.

Ilex (Prinos) verticillatus, the winter berry or black alder, native to the Eastern States, has proven more satisfactory with us. Though summer drought interferes somewhat with its health, it yet grows and blooms, and nearly every year bears the abundant bright scarlet berries which are its chief beauty. These are persistent throughout the earlier part of the winter and after the fall of the leaf are conspicuous, brightening the shrubbery decidedly.

Celastrus scandens, the bitter sweet, a twining woody vine native to our lowland copses and fence rows, is well worth cultivation, both for its bright, clean foliage and yellowish flowers, and for its wealth of yellow berries, which, when fully ripe, burst open, showing the red pulp surrounding the seeds. In this condition the berries hang late, bringing decided color by way of relief to the autumnal dullness in the woody garden. There is great variation among individual plants with respect to the abundance and size of the ornamental fruit, and it is well to select during the autumn the plants in the copses, removing to the garden only those most desirable in these respects. Bird sown vines are abundant wherever this species is native. The climbing habit of the vine demands provision for its support, which may be afforded by a veranda pillar or by the branches of a shrub or low tree over which it may be allowed to clamber at will. Under the latter treatment especially fine effects are produced.

Euonymus, Burning Bush, or Staff-tree. Of this genus three species have been planted, one of these, *Euonymus americanus*, proving insufficiently hardy, and otherwise undesirable. Of the others, the *Euonymus atropurpureus*, a native to our woodlands and copses, is the more desirable, both for its freer hardier growth and for its more conspicuous and abundant purple flowers, as well as for its richly colored fruit, which, like that of the bitter sweet, gives decided color during a season of dearth. The bush itself is not likely to win attention on other accounts, though by no means objectionable. It may be readily propagated by means of sprouts when a suitable individual has been selected, though its habit of sprouting is not sufficiently pronounced to make it troublesome in the lawn. The third form, *Euonymus europaeus*, or European staff-tree, is of less vigorous habit, more formal, stiff branched, and scarcely desirable except for variety, where the native form is planted.

E. A. POPENOE.

ARRANGEMENTS FOR THE STATE DAIRY ASSOCIATION.

RAILROAD RATES.—All railroads have granted a one-and-one-third fare from all points in Kansas and including Kansas City and St. Joseph, Mo. Persons going will purchase tickets at full rate, taking a receipt for each ticket purchased, and over each road provided a through ticket is not purchased. Upon arrival the certificates should be turned over to Mr. T. A. Borman, secretary. If one hundred or more such certificates are turned in they will be honored for returning at one-third fare. Tickets may be purchased from March 1 to 7, good returning till March 11.

ARRIVING AT MANHATTAN.—We hope all visitors will, as far as possible, arrive during the day and not on the midnight trains. However, we expect to have one of the dairy students meet every train and direct people where to go. In case any of our plans miscarry and a train be missed, visitors should take a hack and go to Park Place, about fifteen blocks from either depot, where some one will be stationed day and night to answer questions and show visitors rooms and boarding places.

HEADQUARTERS.—The Secretary's office, in the Main building of the College, will be headquarters for the association during the day and evening sessions. Hotel headquarters will be maintained at Park Place, five blocks from the foot of the College walk.

HOTEL RATES.—Board and lodging can be had at Park Place for $1.50 per day; or, room $1; or, room for two, 75 cents each; meals, 25 cents. Board and lodging in private families for $1 per day, or meals for 25 cents. Dinners can be had on the College grounds for those who do not care to return to town.

HACKS.—There will be hacks to meet every train to carry visitors to the College or to hotel headquarters. Hacks will run between the city and the College at stated intervals. Hack fare ranges from 10 to 25 cents. It might be well to ask the hackman his price before entering the hack so that there will be no misunderstanding as to the rate. Hotel headquarters being only five blocks from the foot of the College walk, doubtless many visitors will prefer to walk to and from College.

THE PROGRAM.—A detailed program is published in this issue of the INDUSTRIALIST. Much credit is due the secretary of the Dairy Association for the very excellent program he has arranged for this year's session. After reading the program we feel sure that no dairy farmer can afford to miss the feast of good things afforded at that time. We are planning for and expect a large crowd. We hope many readers of the INDUSTRIALIST will be at Manhattan during this week.

D. H. OTIS.

PROGRAM.

Kansas State Dairy Convention, Manhattan, March 4 to 7, 1902.

Tuesday Evening, March 4, 7:30 o'clock.

In College Chapel.

Music.

President's Address, - - - - - - - - - E. C. Lewellen
Newton, Kan.

Music.

Secretary's Report, - - - - - - - - - - T. A. Borman
Topeka, Kan.

Ensilage: Its Value to Dairymen and Stock Growers, - - - - - E. N. Cobb
(Buff Jersey.) Monmouth, Ill.

Music.

New Basis Upon Which Farm Separator Cream is Bought, - Prof. E. W. Curtis
Council Grove, Kan.

Wednesday Morning, March 5, 9 o'clock.

Music.

The Use of Dairy Products in Cooking, - - - - Prof. Edith A. McIntyre
Manhattan, Kan.

The Relative Value of Feeds, - - - - - - - - - - E. B. Cowgill
Editor of *Kansas Farmer*, Topeka, Kan.

Music.

Silos: How to Build Cheaply, How to Fill. What to Fill With, - - - E. N. Cobb
(Buff Jersey.) Monmouth, Ill.

Wednesday Evening, March 5, 7:30 o'clock.

Music.

Dairying in Europe, - - - - - - - - - - - Major Henry Alvord
Chief Dairy Division, U. S. Bureau of Animal Industry, Washington, D. C.

Address, - - - - - - - - - - - - - - S. E. Bassett
Deputy Food Commissioner, Lincoln, Neb.

Thursday Morning, March 6, 9 o'clock.

(Skimming-Station Operators' Session.)

Music.

The Dairy Student After He Leaves College, - - - - - - Prof. D. H. Otis
Manhattan, Kan.

The Skimming Operator: What He Is and What He Should Be, - - F. L. Huxtable
Wichita, Kan.

Music.

Examination: Station Operators' Class, - - - - - - - - W. H. McKinstry
Topeka, Kan.

Pasteurization and its Relation to Kansas Dairying, - - - Prof. Ed. H. Webster
Manhattan, Kan.

Music.

Butter for European Market, - - - - - - - - - Prof. G. L. McKay
Ames, Iowa.

Thursday Evening, March 6, 7:30 o'clock.

(Dairy Students' Session.)

Music.

Evolution of the Dairy Cow, - - - - - - - - - N. L. Towne

The Diet of the Kansas Dairy Cow, - - - - - - - - - - Carl Elling

The Ups and Downs of the Babcock Test, - - - - - - - D. Holloway

Music.

Where Does Kansas Come In? - - - - - - - - - - W. H. Olin

What Shall We Do With the Skim-milk, - - - - - - - - John Griffing

The Possibilities of a Private Dairy, - - - - - - - - G. W. Loomis

Music.

Dairying Illustrated, - - - - - - - - - - - E. W. Simpson

Contest of Dairy Short-course Students in Skimming Station Management.

Friday Morning, March 7, 9 o'clock.

Music.

Crop Rotation, - - - - - - - - - - - Dr. Henry Wallace
Des Moines, Iowa.

Growing and Feeding Alfalfa, - - - - - - - - - H. D. Watson
Kearney, Neb.

Music.

How Profits in Kansas Dairying May be Doubled, - - - - Prof. H. M. Cottrell
Manhattan, Kan.

Friday Afternoon, March 7, 1:30 o'clock.

At College Barn.

(Before the Dairy Stock-Judging School.)

The True Type of a Dairy Cow (living illustrations), - - - - Prof. A. L. Haecker
Lincoln, Neb.

Dairy Students' Contest in Stock Judging.

Friday Evening, March 7, 7:30 o'clock.

Music.

Due West; or, Around the World in 192 Days, - - - - - - J. E. Nissley
Topeka, Kan.

Music.

Address, - - - - - - - - - - - - Dr. Henry Wallace
Des Moines, Iowa.

Presentation of Prizes to Short-course Dairy Students.

Contestants in Butter Making: J. A. Ambler, R. P. Arnold, G. Eastman, A. Goatley, H. P. Goodell, C. J. Griffin, W. H. Howard, P. Leiser.

Contestants in Butter Scoring: E. Adams, J. O. Ambler, A. Mantz L. R. Manley, A. H. McManis, S. H. Remington, R. Taylor, M. W. Wheeler.

Contestants in Skimming-station Management: C. M. Clark, C. F. Eldredge, J. O. French, G. W. Hunt, J. E. Jobe, P. W. Keys, R. L. Payton, C. F. Thestrup.

Contestants in Stock Judging: J. W. Bigger, H. R. Blair, C. T. Bull, W. C. DeSelm, W. A. Hamilton, T. E. McClelland, C. A. Peairs, C. C. Winsler.

The association will hold no afternoon meetings. This will give all members an opportunity to attend the dairy stock-judging school which will be in session each afternoon of the week, March 3 to 8, inclusive. The stock-judging school is conducted by the Kansas Agricultural College and all members of the Dairy Association will be admitted to the classes free, and are invited and urged to attend. Before the school a number of prominent judges will appear. Among the number will be: H. W. Cheney, Topeka, Kan., E. N. Cobb, Monmouth, Ill., Prof. A. L. Haecker, Nebraska Agricultural College, Lincoln, Neb. T. A. Borman will be instructor.

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.
Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

Professor Mayo's family is enjoying a new piano.

The seniors gave a reception to the juniors Friday night.

The Board of Regents will meet at the College on March 4.

Harry Rushmore, '79, was a welcome visitor at his Alma Mater last Tuesday.

Manhattan is discussing the erection of a new city hall and fire-department building.

Next week's INDUSTRIALIST will appear as a souvenir edition in honor of the State Dairy Association.

Maj. Chas. Eastman was ill for several days the past week and could not attend to his College duties.

The regular stock sale of the Manhattan Stock-yard Association will come off on Saturday, February 1.

Student Henry Otto will deliver the *Daily Capital* to any party in Manhattan or the College for ten cents per week.

Professor Brown will take the names of any who expect to go to Topeka for the Nordica recital, and will see that seats are reserved.

The annual address before the triennial meeting of the Alumni Association at Commencement will be delivered by Mrs. Kedzie-Jones, of Berea College.

Basket ball is becoming popular with the young men as well as with the young women. The drill hall in the Armory has been fitted up for the game and resounds every afternoon with the merry noise of enthusiastic players.

Dr. A. Emch, of Colorado State University, formerly a member of the Faculty of this College, sends us a neatly printed separatum of twenty pages containing a discussion of the Cyclographic Transformation of Space, and the Coincidence of Twisted Curves.

Prof. O. P. Hood and wife, of Houghton, Mich., are visiting Washington this week for the purpose of sightseeing. Professor Hood, who was until two or three years ago professor of engineering in the Kansas Agricultural College, at Manhattan, holds a similar chair in an institution at Houghton.—*State Journal.*

The Progressive Agriculture Club meets every Saturday night in the Agricultural building. The attendance is usually large and the programs and discussions spirited. Last Saturday the club debated General *vs.* Special Farming.

Pres. J. D. S. Riggs, of Ottawa University, came in Saturday and was the guest of Prof. C. E. Goodell until Monday. He preached at the Baptist church Sunday morning and evening and was looking over the College Monday morning.

A number of students who failed in all or nearly all of their examinations at mid-term were advised by the Faculty to withdraw from College for the remainder of the term. Several others were advised to reduce their studies and many others were asked to work harder and use their time more economically. As a whole, the students have done very satisfactory work during the past six or seven weeks.

Professor Lantz's laboratory of prairie-dog poison, located in the basement of the Girls' Gymnasium, consumes daily about six dozens of eggs, sixty pounds of sugar, nine pounds of green coffee, eight pounds of potassium cyanide, and one hundred seventy six ounces of strychnine. The quantities given above will fill about eighty-eight cans, all that can be manufactured per day by Professor Failyer, who is making the deadly preparation. Of late the requests have poured in so rapidly that this quantity is insufficient to supply the demand.

Pres. E. R. Nichols, Regent Fairchild and Professors Willard and Cottrell spent Saturday, the 15th, investigating conditions on the Fort Hays farm. They ordered an accurate survey of the grounds. Three hundred forty-five acres of the land will be broken at once for experimental work. Twelve quarter-sections are already available for College use and the remaining nine become so in from two to five years, as the various leases expire.

At the session of the State Normal board of regents, February 20, the contract for the construction of the new library building was awarded to J. W. Berry, of Jewell City. He will receive $47,774 for his work, which is $496 below the next lowest bid, that of Henry Bennett, of Topeka. Mr. Berry is a graduate of the Agricultural College, and is at present doing the stonework and plastering of the new Physical-Science building at this institution, a contract amounting to over $25,000.

The short course in poultry work given last week at the Kansas State Agricultural College proved even a greater success than was expected. Three hundred twenty five students were studying poultry scoring under the direction of Judge C. H. Rhodes, of Topeka. Many visitors, both ladies and gentlemen, took the work with the students. Judge L P. Harris, of Clay Center, Neb., assisted Judge Rhodes. He also gave an elaborate lecture on egg formation. Leading poultry fanciers of the State gave addresses each afternoon, and the meeting closed Friday evening

with an illustrated program and a social in the College chapel. Twelve breeds of chickens, as well as ducks and turkeys, were being studied by the students. Scott Brothers, of Westmoreland, donated a pair of peacocks to the College in honor of the occasion. The institute was the first of the kind held west of the Allegheny mountains. It was a complete success, notwithstanding the unfavorable weather, and it is safe to predict that it will be repeated next year and become a permanent part of the work of this College.

During the week of February 24 to March 1, special work will be given in beef production at the Kansas State Agricultural College. Each afternoon John Gosling, of Kansas City, one of the greatest expert judges of beef cattle in the United States and Canada, will give instruction in selecting and judging beef animals. Classes each forenoon will make a study of steer feeding. Friday evening, February 28, a program will be given in the College chapel. Addresses will be made by Senator H. B. Miller, of Osage City; Col. J. P. True, of Newman; Guilford Dudley, of Topeka, and M. M. Sherman, of Geneseo. Senator Miller has had twenty years of experience in feeding steers and is now running a fourteen thousand acre ranch to its full capacity; Colonel True is one of Kansas' oldest Shorthorn breeders; Colonel Dudley produces on a large scale beef of unusual flavor and quality; Mr. Sherman raises his cattle on immense ranches in Old Mexico and fattens them on his thirty thousand acre ranch near Geneseo. Many prominent feeders will take part in the discussions, and the week's work will be open to everyone interested in beef production. All instruction will be free for everybody. Come!

It is evident that the College has hit the proper solution of the prairie-dog problem. News is coming in every day that the poison mixture prepared by Professor Lantz is doing its intended work effectively and with dispatch. The first lot of poison was sent out on January 15, and during the thirty days following the College sent out over $1300 worth of the composition. Orders are now pouring in from all parts of Kansas and from Colorado and Oklahoma, though the requests from places out of the State are not being honored so far. As the mixture isproving its value the orders increase. On February 14 over 100 cans were sent out; on February 19, the day this item was written, orders were received amounting to $315 and 116 cans were being shipped. One man near Goodland writes that he wants poison for 11,000 acres of dogs. Professor Failyer is kept busy with the preparation of the mixture while Professor Lantz does the corresponding and expressing. A good deal of corresponding is caused by the assumption of many farmers that the State or the College are furnishing the poison mixture free of charge to those who write for it. The mixture is furnished in half-gallon cans, securely packed and properly labeled, at the price of $1.50 per can, which is the wholesale price for the ingredients and the boxing. A can of the mixture is intended to kill several thousand dogs—all that will likely be found on a quarter-section in the most densely infested districts.

The Department of Domestic Science has lately come in possession of a Mexican curiosity—a hand corn mill, such as the Mexican housekeepers have been using since the days of King Montezuma, and will keep on using until the modern roller mill will make its further use absurd and ridiculous. The neatly cut and finished stone slab is a present to the College by J. G. Haney, the former assistant of the Farm Department.

Washington's birthday, February 22, was duly observed by the College as a holiday, but while there were no classes hearing lectures, and while many students went home over Sunday to get a glimpse of the paternal fireside and replenish the ever-empty student's larder, every laboratory and drafting room was full of students eager to make up lost time or to spend the continuous hours of the day over more difficult and extensive problems.

ALUMNI AND FORMER STUDENTS.

The *Herald* announces the marriage of Jennie June Needham, '99, to Mr. Floyd Carter, of Lane, Kan., January 15.

The many friends of H. T. York, '01, will be pained to learn that notwithstanding all efforts, including changes of climate, he succumbed to tuberculosis, Sunday, February 16, at El Paso, Tex. Mr. York was a most estimable young man, a good student, a hard worker, and beloved by all. His bereaved relatives will have the sympathy of his many College friends.

The Parsons *Evening Herald*, by W. C. Moore ['88], formerly of the Junction City *Union*, made its appearance on the 11th. It is a newsy sheet, and the office is equipped with all the modern appliances of a daily. It will be watched with interest by the fraternity on account of the expensive machinery put in, as few newspaper men believe it will pay in a small town already well supplied with daily papers.—*Mercury*.

From Emporia comes the music of bells, announcing the marriage of Miss Minnie Rich, of that city, to Dr. George W. Smith ['93], of Omaha, son of Capt. J. T. Smith. The ceremony occurred in the First Presbyterian church, of Emporia, performed by Professor Hill, of the State Normal School. The church was beautifully decorated with palms, ferns and cut flowers; the sun beamed joyously down after almost a week of blues. Accompanying the bride as bridesmaid and maid of honor were Misses Jessie Fodge and Frances Evans. The bride was attired in a becoming and very beautiful white creation of dress-making art, wore a bunch of fragrant orange blossoms and carried a bouquet of bride's roses and carnations. The maids were almost as charmingly gowned in white, each wearing bouquets of roses and carnations. Mr. George Helder, of this city, officiated as next man to the groom, and Dr. Frank Ekdal and Mr. A. T. Martin as ushers. The newly wedded couple arrived in Manhattan at 8 P. M. Monday.—*Nationalist*.

ONION NOTES.

(Press Bulletin No. 111, issued by Horticultural Department.)

Onions may be grown on any soil, yet for onions, as for all other crops, there are soils that are better than others. The best soil is a rich, sandy loam, as free as possible from weeds. A well-cultivated field of sandy loam that has been well manured with stable manure for several years will grow good onions. Onions should never be put in a soil that is foul or that has been too recently fertilized with barnyard manure, unless the manure has been well rotted.

Ground that is intended for onions this year should be plowed very early in the spring and disked later. The ground should be well cultivated just before the onions are put on the land.

There are two methods of sowing seed. The old way was to sow in drills in the field as you would peas or other garden crops. After this the fight with the weeds was sure to disgust the cultivator of onions. In the end we had sacrificed many of the plants in trying to kill the weeds, and, of course, had a very poor stand of onions. During the past few years the cultivators of onions for commercial purposes have been growing their onions in hotbeds and then planting them out in the field. Some of the advantages of this method are: (a) The crop matures earlier; the seeds may be sown in the hotbeds in February; (b) the onion transplants with as much ease as any of the garden plants; (c) it materially increases the yield, because of the more even stand and because of the choice of the better seedlings for the row, where, if we allowed them to grow in drills, the stronger ones are liable to come up too near together to allow them to grow, and many of the best plants are destroyed while the weaker ones grow up where we want the stronger ones; (d) it does away with the task of weeding, thus making the production cheaper. By actual experimentation it has been found that the cost of maturing the crop when transplanted is somewhat less than when the seeds are sown in drills in the field.

The temperature of the hotbeds should be below eighty degrees when the seeds are planted. When the seedlings are of a size to set out, which will be in about six weeks, the ground should be thoroughly cultivated so as to kill all the weeds that may be starting. The ground should then be laid off in rows eighteen to twenty inches apart. Onions will stand a great deal of crowding, and some growers put them as close as twelve inches. When the plants are being removed from the hotbed the tops should be cut back. The plants are usually set three inches apart in the row, with the lower end of the bulb about an inch below the top of the ground. The transplanting may be done with an ordinary dibble. The cost of maturing an acre of onions in this manner is about twenty dollars, including seeds, hotbeds, transplanting and cultivation. The cost for an acre in drills is about the same.

The cultivating may be done with a horse or with a wheel hoe. For tending crops of this sort, the Experiment Station has successfully used a wheel hoe with the onion hoe attachment. The advantage of using this implement is that the rows may be grown closer together. The increase in yield will increase the profits on a given area. The implement adapted to this sort of work is advertised by all dealers in garden tools, and costs from four to ten dollars. No onion raiser should be without one, as its knives run on each side of the row, and clean out all the weeds except those that are directly in the row with the onions.

It is not necessary that the tops be broken over for the crop to ripen. They will ripen almost as soon, and quite as well if they are left alone. In harvesting, the bulbs are pulled and thrown in windrows to lie in the sun a few days until the outside is dry, though they must not be allowed to sunburn. When dry on the outside they are taken in and spread upon the floor of a barn or storeroom until thoroughly dry. An open building that will keep off the sun and will allow the circulation of air is best. A corn-crib is as good as anything. When dry, they are stored in boxes, barrels or burlap sacks. Some growers store them in layers eight to ten inches deep in a well-ventilated room. If the onions have not been properly dried and cured, it is necessary to sort them over very often, or, at least, to stir them to prevent heating. The storeroom should be kept dry and cool; if just above the freezing point, so much the better. Onions may be sorted much the same as potatoes, though care must be taken that they do not get bruised. A special form of vegetable sorter is generally used.

Good land that is well cared for should grow from two hundred to four hundred bushels of onions per acre. Three hundred fifty bushels would be a good average yield on land under high cultivation. The varieties that have done best at the Kansas Station are: Prizetaker, Yellow Danvers, Red Wethersfield, Silver King and, later, the Giant Gibraltar.

G. O. GREENE.

STATE DAIRY ASSOCIATION
SOUVENIR NUMBER

THE INDUSTRIALIST

Historical Society

VOLUME 28. NUMBER 20.

ISSUED WEEKLY BY

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EDITOR-IN-CHIEF, PRES. E. R. NICHOLS
LOCAL EDITOR, PROF. J. D. WALTERS
ALUMNI EDITOR, PROF. J. T. WILLARD

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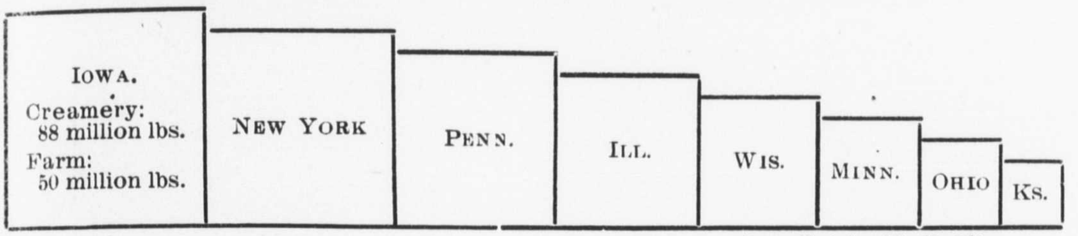
INSTRUCTIVE DAIRY DIAGRAMS.

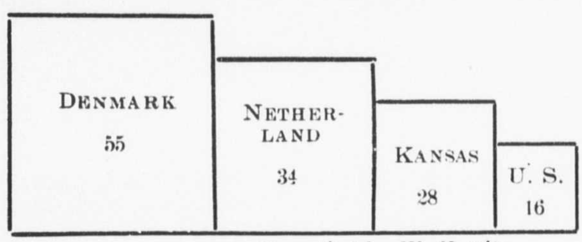
Kansas' Rank in our Nation in Butter Production.



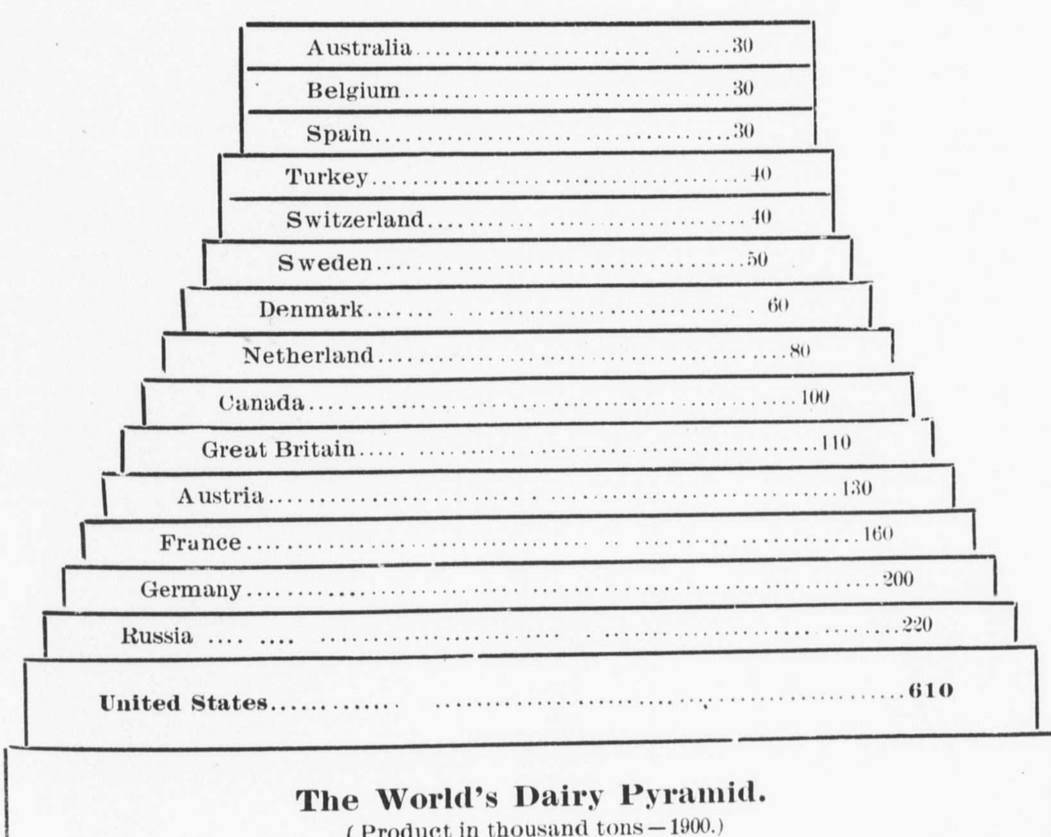
Compiled by W H Olin.

Dairy Products of our State and our Nation Compared with Denmark and Holland Per Capita in 1900.

(*Amount in pounds. From U. S. Bureau of Statistics.*)



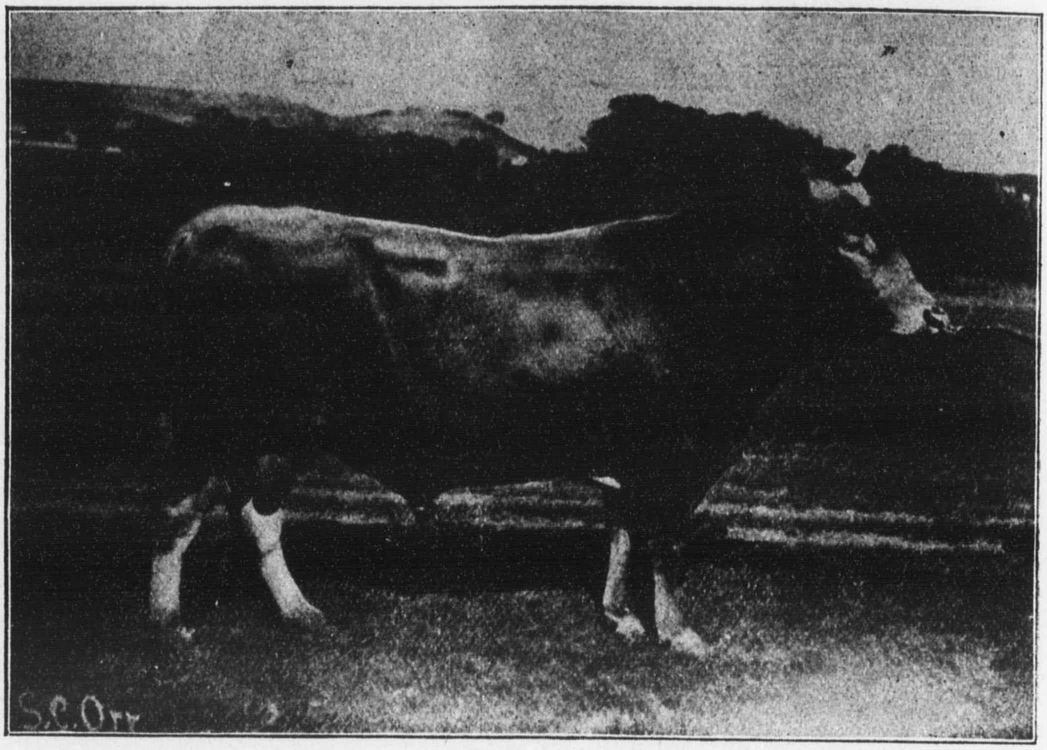
Compiled by W. H. Olin.



The World's Dairy Pyramid.
(Product in thousand tons—1900.)

From Olin's Commercial Geography.

BULLS THAT HAVE HEADED THE COLLEGE DAIRY HERD OF COMMON COWS.



CAMPBELL KING 4951. A. G. C. C.

Record of Dam: 600 pounds of butter in one year.

SHYLOCK OF DARLINGTON 4579, A. G. C. C.

Record of Dam: 556 pounds of butter in six months.

THE INDUSTRIALIST.

VOL. 28. MANHATTAN, KAN., MARCH 4, 1902. NO. 20

WHAT SHALL WE DO FOR PASTURE?

WHEAT and rye pasture, if available, will serve an excellent purpose for a short time. Succotash, a mixture of any spring grain and winter rye, is highly recommended by *Wallace's Farmer* and is said to produce excellent pasture in a short time. Wheat, rye, oats, and in some localities barley, may be used for this purpose. The ground should be well prepared. If three grains are used, sow one-third of the usual amount of each; if four, sow one-fourth, and so on. Stock may be turned on as soon as the grass is high enough to graze.

Dwarf Essex rape has given excellent results at the Kansas Experiment Station as hog pasture. It has also been used to a limited extent as pasture for cows. Neither hogs nor cattle seem to relish it at first, but after becoming accustomed to it, eat it greedily, especially when it is not allowed to grow too rank. Rape may be sown any time from early spring to late summer, and is good until frost. Five to six pounds per acre is sufficient. It can be sown to good advantage in the succotash mixture mentioned above at the rate of three to five pounds per acre. Rape and oats mixed will also make good pasture. Barnyards that might otherwise grow up to weeds can be seeded to rape and furnish immense quantities of hog pasture. Rape is sometimes seeded in corn fields prior to the last working and used as pasture for stock after the corn is gathered, and is said to lessen the danger from impaction.

During the summer of 1901, the Kansas Experiment Station secured excellent results in pasturing green sorghum. This feed was ready to use when pastures were dry, and it yielded an immense amount of feed from a small area. The College dairy herd was pastured on green sorghum from July 1 to September 15, without a particle of injury of any kind. The herd became accustomed to the sorghum gradually. Notwithstanding our success in pasturing green sorghum we are not ready to recommend it. Numerous cases are on record of deaths caused by it (sorghum poisoning); we believe much of this trouble has been caused by cattle going on to the sorghum with empty or partially empty stomachs, yet the man who pastures it must do so at his own risk.

Since pasture will be scarce we may have to resort to soiling crops. For this purpose green alfalfa heads the list. During the summer of 1899 the Kansas Experiment Station soiled ten head of cows, from May 10 to August 1 (74 days), from 2.97 acres of alfalfa. While the College has used green alfalfa successfully as a soiling crop it has not made a success of pasturing it. During the month of August the ten cows were fed green corn from 1.22 acres; during September green sorghum and Kafir-corn from 1.39 acres. Each dairy farmer should provide plenty of soiling crops to use when pastures become short and dry.

At the same time that we are securing green feed for our stock it will be necessary to renovate our old pasture. For this purpose a disc is indispensable. Grass needs cultivating the same as corn, and as the disc cuts through the sod it aerates the soil, cuts the roots of the grass and causes them to sprout with renewed vigor. While providing for this year's emergency it would be well to look ahead for permanent pastures next year. Where prairie grasses are well established let them remain. Where the soil is broken the best grass mixture in the vicinity of Riley county is orchard grass 20 pounds, English blue grass 15 pounds and red clover 5 pounds per acre, sown broadcast or drilled both ways of the field.

D. H. OTIS.

A SHORT HISTORY OF THE KANSAS STATE DAIRY ASSOCIATION.

THE rapid advance of the dairy interests in Kansas is to be attributed largely to the work of the Kansas State Dairy Association, which was organized in 1887. The organization grew out of an appeal to the dairymen of the State, and was launched as an organization of farmers and dairymen. The Hon. J. G. Otis, at that time a member of the Kansas legislature, and a life-long dairymen, was its first president.

In three years after the organization, the creamery men of the State became more actively interested, and in the year 1890 the officers of the association were, without exception, either proprietors or patrons of the creameries. The success of the creamery interests depends primarily upon the diffusion among farmers of knowledge pertaining to breeds, milk-producing feeds, and feeding for milk. The association is supported by liberal contributions by creameries of the State. The State Dairy Association has accomplished much more than many State organizations.

The first published proceedings of the association appeared in 1900, reporting the proceedings of that meeting, which was a booklet of about sixty pages. Each year since, a report of the

proceedings has been published, and a total of one hundred thousand copies has been circulated among farmers of the State. By this means the association spread dairy knowledge, and more good has doubtless been accomplished than by any other means. The last report contained about one hundred fifty two pages. The reports are worth a great deal to the literature of the State, for the reason that therein are contained the best thoughts of a large number of experts along various lines pertaining to dairying.

The leading men of the United States have appeared on the programs of the association. The Kansas association has spent more money in securing programs than is spent by most associations of this character. We venture to say that no association supported by voluntary contributions and membership fees has accomplished so much. The association has not received one dollar's worth of State aid, however much its members are inclined to believe it should receive such aid. T. A. BORMAN.

A COW CONTEST EXPERIMENT.

NINE dairymen who have made excellent records with their cows have each complied with a request from the Agricultural College to select the best cow that he could lay down at Manhattan for $50, each man to make the selection outside of his own herd. The College paid all freight charges above $10, leaving at least $40 to be spent for the cow at each man's home. The State Dairy Association is to offer a prize to the man that sent the best cow, a part of the prize to be awarded this year, based upon the judgment of experts, and the remainder to be given next year, based upon the actual record kept by the Dairy Department of the Agricultural College.

The following persons made selections:

NAME.	Post-office.	County.	Name of Cow.	Age.	Fresh.
J. W. Bigger	North Topeka	Shawnee	Cowslip	7 years,	Nov. 3, '01.
E. C. Cowles	Sibley	Douglas	Haster	6 years,	Dec. 10, '01.
J. W. Cunningham	Meriden	Jefferson	Rose of Cunningham,	5 years,	Jan. 28, '02.
M. L. Dickson	Edgerton	Johnson	Clover Leaf	8 years,	Jan. 12, '02.
A. H. Diehl	Chapman	Dickinson	Molly	7 years,	Jan. 20, '02.
C. Elssaser	Industry	Clay	Rose of Industry	7 years,	Jan. 15, '02.
S. A. Johnson	Cleveland	Kingman	Daisy Bell	6 years,	Mar. '02.
C. C. Lewis	Ottawa	Franklin	Floss	5 years,	Oct. '02.
G. W. Priest*	Meriden	Shawnee	May Queen	5 years,	Dec. 25, '01.

*Post-office, Jefferson county; farm, Shawnee county.

We believe this selection of common cows by experienced dairymen and watching their monthly records will result in increased interest among dairy farmers in the selection of better cows.

D. H. OTIS.

THOROUGHBRED CATTLE AT THE KANSAS STATE AGRICULTURAL COLLEGE, MARCH 1, 1902.

	Name.	Sex.	Date of Birth.	Breeder.	Wt. Mar. 1	Remarks.
				BEEF BREEDS.		
Aberdeen Angus.	Axtell of Osborne 38360	Male	June 25, 1899	W. O. Parks, Atchison, Kan	1358	**Donated by W. O. Parks.**
	Mumpower 39705	Male	Mar. 13, 1900	H. W. Elliott, Estill, Mo	1374	Purchased of Breeder.
	Darling 5th, 22763	Female	Oct. 31, 1894	Anderson & Findlay, Allendale, Kan.	1445	Purchased of Breeder.
	Rosial 4th, 32764	Female	May 25, 1898	Anderson & Findlay, Allendale, Kan.	1132	Purchased of Breeder.
	Darling of Manhattan 46369	Female	Feb. 6, 1901	Anderson & Findlay, Allendale, Kan.	790	Purchased of Breeder.
	Rosial of Manhattan 46370	Female	July 10, 1901	Anderson & Findlay, Allendale, Kan.	575	Purchased of Breeder.
	Barcola	Female	Jan. 31, 1902	Anderson & Findlay, Allendale, Kan.	137	Dropped on College Farm.
Galloway.	First King of Avondale 19420	Male	Apr. 9, 1900	H. H. Harris, Marshall, Mo.	1307	Purchased of O. H Swigart.
	Dantling 15271	Female	Nov. 10, 1898	E. W. Thrall, Eureka, Kan.	955	Purchased of Breeder.
	Black Velvet of Dyke C'k 18277.	Female	June 11, 1900	M. R. Platt, Kansas City, Mo.	983	**Donated by M. R. Platt.**
	Golden Sunset of Dyke C'k 18283	Female	June 6, 1900	M. R. Platt, Kansas City, Mo	772	**Donated by M. R. Platt.**
Hereford.	Excello 114621	Male	May 23, 1900	J. M. Foster & Co., Topeka, Kan	1291	**Donated by J. M. Foster.**
	Perfection Maid 116691	Female	May 30, 1899	Steele Bros., Belvoir, Kan.	1209	**Donated by Steele Bros.**
	Agistha 116000	Female	May 28, 1900	G. W. West, Silver Lake, Kan	1053	**Donated by Geo. W. West.**
	Azelda	Female	Sept 14, 1901	Steele Bros., Belvoir, Kan.	401	Dropped on College Farm.
Short-horn.	Easter Lily	Female	Apr. 2, 1899	T. B. Babst, Dover, Kan	1188	Purchased of Breeder.
	Mary of Elderlawn	Female	Sept. 1, 1899	T. K. Tomson & Son, Dover, Kan.	1250	Purchased of Breeder.
	Queen of Eureka Valley	Female	Jan. 18, 1901	John Warner, Manhattan, Kan	819	**Donated by John Warner.**
	Aztec	Male	Oct. 28, 1901	T. B. Babst, Dover, Kan	310	Dropped on College Farm.

DAIRY BREEDS.

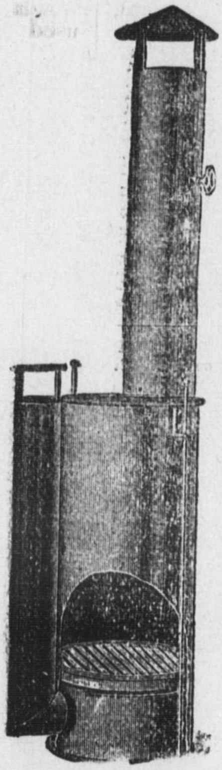
Ayrshire.	Marquis of Woodroffe 12945	Male	Sept. 27, 1900	J. G. Clark, Ottawa, Ont	905	Purchased of J. G. Clark, Ottawa, Ont.
	Star of Hillview 11455	Female	Oct. 3, 1898	A. Kennedy & Son, Vernon, Ont.	961	Purchased of Breeder.
	Maggie Woodroffe 10837	Female	Nov. 14, 1898	J. G. Clark, Ottawa, Ont	946	Purchased of J. G. Clark, Ottawa, Ont.
	Glenora Belle 14089	Female	Aug. 9, 1901	R. S. Brooks. Brantford, Ont	390	Purchased of J. G. Clark, Ottawa, Ont.
	Bangora	Female	Jan. 30, 1902	W. W. Ogilvie, Montreal, Canada	71	Dropped on College Farm.
Guernsey.	Shylock of Darlington 4579	Male	May 9, 1896	Chas. Solveson, Nashotah, Wis	1595	Purchased of Breeder.
	Countess Vesta 11822	Female	May 31, 1899	Geo C. Hill & Son, Rosendale, Wis	725	Purchased of Breeder.
	Miss Tidy 13597	Female	Mar. 11, 1900	F. S. Gorton, Chicago, Ill.	823	Purchased of Hill & Son.
	Balanta	Female	Dec. 20, 1901	Geo C. Hill & Son, Rosendale, Wis	135	Dropped on College Farm.
Holstein-Friesian.	College Emperor 28754	Male	Dec. 26, 1899	C. F. Stone, Peabody, Kan.	1350	Purchased of Breeder.
	College Mechthilde 56797	Female	Oct. 11, 1899	C. F. Stone, Peabody, Kan.	1136	Purchased of Breeder.
	College Gerben 58796	Female	Oct. 14, 1899	C. F. Stone, Peabody, Kan.	1180	Purchased of Breeder.
Jersey.	Brown Elsie's Grandson 60412	Male	Oct. 22, 1900	H. C. Taylor, Orfordville, Wis	825	Purchased of Breeder.
	Miss Minute 144808	Female	Apr. 11, 1899	H. C. Taylor, Orfordville, Wis	816	Purchased of Breeder.
	Miss Ita 152841	Female	July 18, 1899	H. C. Taylor, Orfordville, Wis	701	Purchased of Breeder.
	Marigold Tapestry 1'9151	Female	Apr. 30, 1901	H. C. Taylor, Orfordville, Wis	431	Purchased of Breeder.

DUAL PURPOSE BREEDS.

Polled Durham.	Young Victor 2nd, 1723 A. P. D. B A., 168548 A. S. H. B.	Male	Aug. 31, 1900	W. M. Cottey, Knox City, Mo	1112	Purchased of A. E. Burleigh.
	Nellie Bride 3rd	Female	June 16, 1896	A. E. & C. J. Burleigh, Mazon, Ill	1635	Purchased of A. E. Burleigh.
	Millie's Favorite	Female	Feb. 16, 1898	A. E. & C. J. Burleigh, Mazon, Ill	1370	Purchased of A. E. Burleigh.
Red Polled.	Cyclone Davis N 6	Male	Sept. 14, 1900	Geo. Groenmiller & Son, Coburn, Kan.	1319	Purchased of Breeder.
	Juno 1st, R 2	Female	May. 9, 1899	F. B. Miller, Prescott, Kan.	1014	Purchased of Breeder.
	Upshot 8th, L 3	Female	June 6, 1899	F. B. Miller, Prescott, Kan	900	Purchased of Breeder.
	Buttercup 1, Norf	Female	Nov. 30, 1900	Chas. Morrison, Phillipsburg, Kan	645	**Donated by C. Morrison.**
	Ayden	Male	Oct. 3, 1901	F. B. Miller, Prescott, Kan	302	Dropped on College Farm.

TANK HEATERS.

WHEN we stop to think that the dairy cow, unlike the beef steer, has a thin hide, with little or no fat beneath the skin and a poor surface circulation, as the blood flows to the udder for the production of milk, we can understand one of the reasons why the yield of some herds is so low. The dairy cow is a very sensitive animal, and when forced to use her food to keep up animal heat and then stand shivering while taking her fill of ice water, she certainly cannot be expected to make a very good showing at the milk pail. The Kansas Experiment Station has been using several makes of heaters in the cow yard and in the feed lots.



BUTLER TANK HEATER.

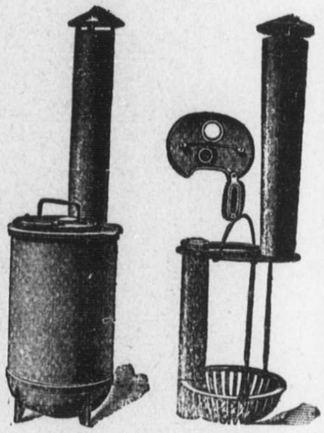
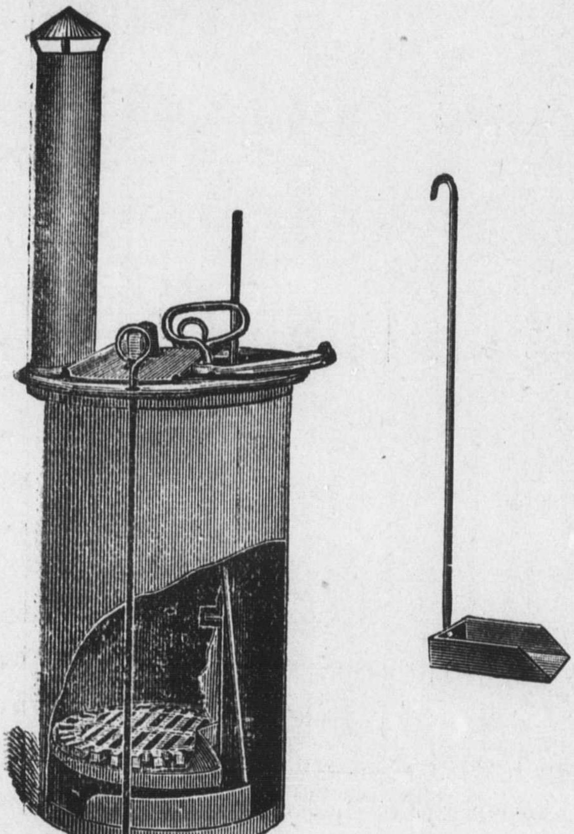


Fig. 1. Fig. 2.
U. S. HEATER.



CHAMPAIGN TANK HEATER.

These heaters were started December 2, 1900 (one started December 10), and were kept going until April 1, 1901, with the following results:

Name.	Manufacturer.	Time fired, days.	Coal, total lbs.	Pounds used daily.
United States..	U. S. Wind Engine & Power Company, Batavia, Ill..	119	1869	15.7
United States..	U. S. Wind Engine & Power Company, Batavia, Ill..	119	1933	16.2
Butler	Butler Company, Butler, Ind.	119	1894	15.9
Butler	Butler Company, Butler, Ind.	119	1538	12.9
Goshen	Kelly Foundry & Machine Company, Goshen, Ind. ...	119	2180	18.3
Champaign	H. Reynolds, Gifford, Ill.	111	940	8.46

Total coal consumed by heaters	10354 lbs.
Average per heater	1725.6 lbs.
Total cost of coal	$20.70
Average cost per heater	$3.45
Average consumption of coal per heater per day	14.66 lbs.
Average cost of coal per heater per day	$0.029

D. H. OTIS.

KANSAS IN THE NATIONAL BUTTER MAKERS' CONTEST.

"WHAT'S the matter with Kansas?" We have all shouted and waved our hats over the great achievements of our twentieth Kansas in the Philippines; we have been proud of our achievements along every line of industry and everything that stands to make our State the great State that it is. If there be drought in the land, Kansas leads; if it be a "bumper" crop, Kansas is in the front rank; if it be politics, we can break the record either way we turn; if it be hard times or prosperity, we lead in both. When it comes to raising cheap dairy products we lead all others. But what of our success in the great butter makers' contest? Indeed, here we may well say, "What's the matter with Kansas?" We answer in one word, and it is not pleasing—ignorance. Ignorance of the principles of butter making. We boast of the greatest creamery in the world. The cheapest feed in the world and climate that combines all that is good and bad in any state in the Union, and yet when we attempt to enter the national contest we come home feeling that all the rest of the butter world look us to shame.

And there is a cause for our failure. It has been legitimate. Kansas butter makers have not had the opportunities offered the older dairy states for gaining a knowledge without going away from home too far. The best butter makers from these states were not attracted to our State because of the great difficulties

under which the dairy business has been built up. The butter makers of Kansas, considering their advantages, have done good work; but we never knew how this would compare with the work of other states until we entered into competition with them. Occasionally a butter maker has scored well, but the majority of us have not cared to publish our score as an advertisement to our business.

While there was a time when there was a reasonable excuse for this, perhaps, that time has passed. The time has come for Kansas butter makers to show to the world that in this, as in every thing else, we will lead or know why.

The State has appropriated money to establish a dairy school and this school is for the use of the Kansas butter makers. free gratis. It is expected that through the instrumentality of this school the Kansas butter maker will take the opportunity to get out of the rut and stand equal to the butter maker of any of the older states. The only thing in the way of our thus standing is our own lack of knowledge. There is not the slightest doubt but just as good butter can be made in Kansas as in any other state in the Union. We will put ourselves in position to show this to the world at the next national convention.

The officers of the National Creamery Butter Makers' Association are planning to hold a six months' contest. This is going to be one of the greatest educational contests in the butter making field ever offered. Fifty Kansas butter makers should enter this contest. These fifty Kansas butter makers should spare no pains to get all the knowledge available for their work. The Dairy Department of the Kansas State Agricultural College stands ready to help them. Write to the Department and get all the information you can. Come to the College and spend a few days getting on to all the newest methods in the art.

Will Kansas creamery men and butter makers let this great opportunity go by? Place Kansas at the head of the list and it will mean increased prosperity to creamery men and farmers alike. Give Kansas the reputation of turning out fancy butter and the markets of the world will seek Kansas butter as they now do Kansas wheat.

Butter makers, use the men the State is paying to help you in this business by writing and visiting them, and get in line for this work.

ED. H. WEBSTER.

THE REARING OF CALVES.

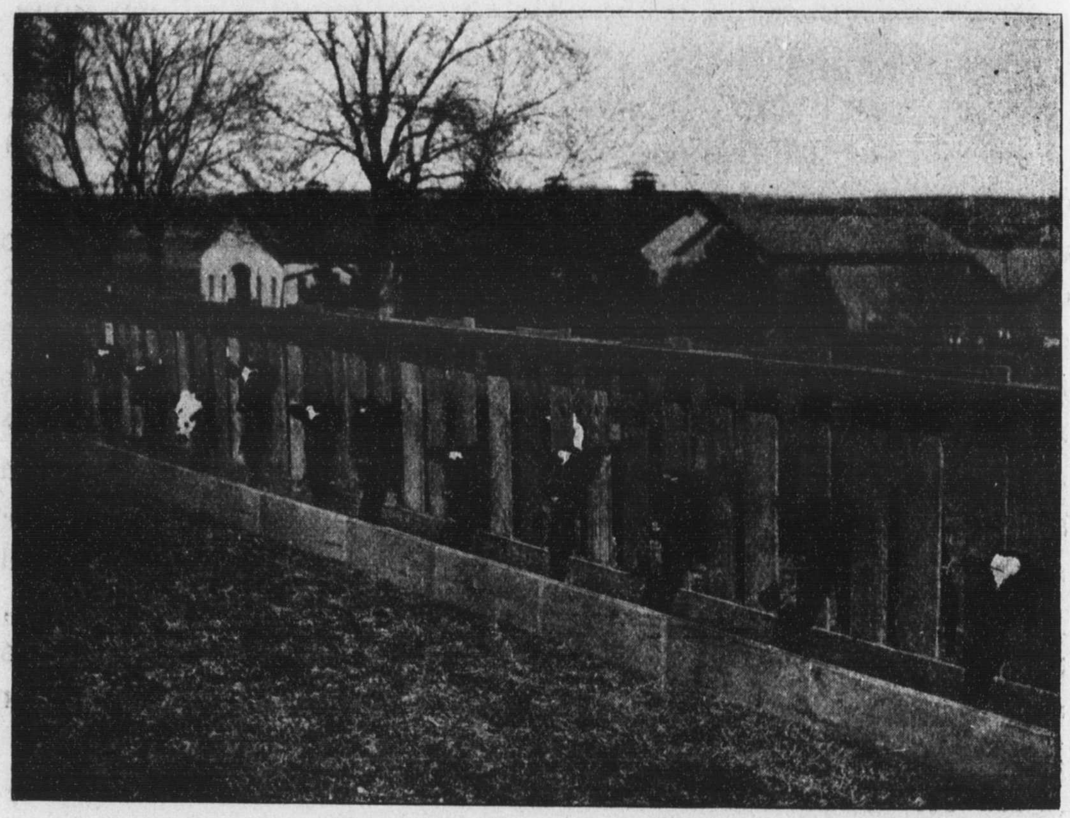
PRENATAL INFLUENCES.—To get best results in rearing calves attention must be given to the mothers of the calves previous to birth. A good dairyman will supply his cows with wholesome, nutritious feeds in abundance. This is necessary for best results at the pail as well as for the best development of the calf. Highest yields of milk and butter fat and the best calves are usually obtained from cows that go dry from six to eight weeks prior to calving. If it is impossible to dry the cow without injuring the udder, continuous milking should be practiced.

A dry cow on good pasture, with plenty of shade and water, will need very little attention except to see that she is not annoyed or injured by other cattle. Sometimes heavy milkers on luxuriant pastures will be stimulated to produce too much milk prior to calving, in which case the supply of milk should be reduced. On dry feed the cows should be kept in good condition, though not too fat. Where alfalfa or clover hay is available, little or no grain is necessary. Ensilage and roots are especially desirable for cows at this time. When grain is used, a mixture of two-thirds bran and one-third oil-meal is excellent. Soy beans make a good substitute for oil-meal. The object is to keep the bowels loose. All these points have an important bearing on the health of the cow, and consequently on the condition and health of the calf, before and after birth. If the cow is sick when the calf is born, the milk is liable to be affected in a way to seriously injure the calf.

AT CALVING TIME.—If the weather is chilly, put the cow in a box stall well bedded and free from draught. When the calf is born, blanket the cow until she regains her normal condition. If nothing better is available, gunny sacks, sewed together, will answer. Give light, loosening feeds and water from which the chill has been removed. Cold water is likely to cause a contraction of the womb and retention of the afterbirth. If the latter is not discharged in twenty-four to forty-eight hours, it should be removed. If the udder is hot and caked, it is better to milk the cow frequently (at least once in two or three hours), but not dry, as a fresh flow would be stimulated which would increase the inflammation and might lead to milk fever. Steaming the udder with a flannel cloth dipped in as hot water as the hands will bear is very desirable, after which the udder should be rubbed dry and treated with camphorated vaseline. Keep the bowels loose. If any

signs of constipation appear, give one and one-half to two pounds of epsom salts, dissolved in warm water. Adhering to these points means much in giving the calf a good, vigorous start.

THE NEW-BORN CALF.—After the calf is licked dry by its mother it usually has strength enough to rise and suck. If it does not it should be assisted in securing its first meal. The calf may then be taken away from its mother, in which case it should



READY FOR BREAKFAST.

be fed the colostrum milk from its mother, or it may be left until the milk is fit for use. Where the cow's udder is in good shape, it is easier to teach the calf to drink when it is taken away before sucking at all. The records at the Kansas Experiment Station show that when a calf is weaned from its mother at once, when four or five days old, it will make good gains the first week, but when left two or three weeks, the first seven days after weaning is a losing period. If the cow's udder is caked, however, it is well to leave the calf with her, as the rubbing of the calf tends to reduce inflammation and soften the udder. Where the calf is several days old before weaning, the moral atmosphere around the calf pen will usually be better if the calf is allowed to go without

eating for twenty-four hours. By that time it is hungry enough to eat without a great deal of coaxing.

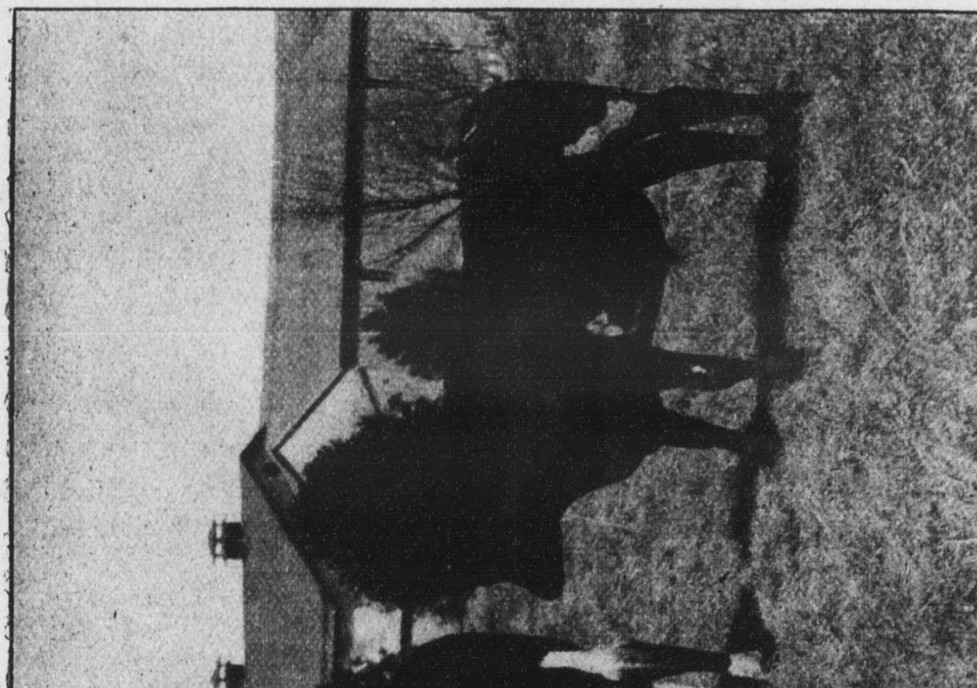
FEEDING THE MILK.—In nature, the calf gets its milk often but in small quantities, and always at blood temperature. In this respect we should imitate nature as far as possible. At first the calf should not be fed over ten pounds daily (one quart equals about two pounds), divided into three messes—four pounds in the morning, two pounds at noon, and four pounds at night. This quantity may be increased gradually to twelve pounds per day. After two weeks the milk may be fed only twice daily. Since the calf is a very greedy animal, there is often a great temptation to give it more milk than it can properly handle, thus causing scours. Over-feeding is undoubtedly one of the main reasons why so many farmers fail in raising good calves on skim-milk. The quantity of milk should be weighed or measured at each feed. Calves from three to five weeks of age will consume from ten to twelve pounds daily; when from seven to eight weeks old, fourteen to sixteen pounds daily; and when three or four months old, from eighteen to twenty pounds. Calf milk should always be fed warm and sweet. If impossible to have the milk sweet all the time, then it should be fed sour every meal. It is possible to raise good calves on sour milk, but it is impossible to raise good calves and have sweet milk one meal and sour the next.

IMPORTANCE OF SKIM-MILK.—Since the advent of creameries, the raising of calves on skim-milk has been a subject of vital importance to every creamery patron, and one of growing importance to every private dairyman. When calves six months old are worth from eighteen to twenty dollars a head, and when the profits from a good milk cow are so greatly enhanced by raising the calf on skim-milk, it is vastly important that we know how, first, to raise a No. 1 calf, and second (especially to the man with limited capital on high-priced land), how to accomplish this result through the medium of skim-milk.

CHANGING FROM WHOLE TO SKIM-MILK.—When two or three weeks old we may begin to feed skim-milk. The stomach of a calf is delicate and sensitive, and any change of feed should be made gradually. Do not change from whole milk to skim-milk faster than a pound or a pound and one-half per day, *i. e.*, if the calf is getting twelve pounds of whole milk per day, the first day of the change feed eleven pounds of whole milk and one pound of

skim-milk; the second day, ten pounds of whole milk and two pounds of skim-milk, and so on until the change is complete.

FEEDING GRAIN.—It has been found by experience that the starch and fat contained in corn or Kafir-corn can be made to take the place of fat removed from the milk. Calves will begin to eat grain when ten days to two weeks old. At first put a little meal in their mouths after drinking their milk, and in a short time



DAIRY BEEF.
Skim-milk steers. Average weight, 724 pounds at one year old.

they will go to their feed boxes and eat with a relish. We find that calves four weeks old will eat from one-half to three-fourths of a pound per day; when eight weeks old, from one and one-fourth to one and one-half pounds per day. Never mix corn, Kafir corn, or any other grain in the milk. The starch of corn must be changed to sugar before it is digestible. This change takes place only in the presence of an alkali, and hence, chiefly by the saliva of the mouth. When the corn is gulped down with the milk the starch is not acted upon by the saliva, and cannot be acted upon by the gastric juice of the stomach, since that is acid instead of alkaline. It will then remain unchanged until it reaches the alkaline secretions of the intestines. Since the intestines of the calf are comparatively short, complete digestion is impossible. In this respect the calf differs from the hog, which has a comparatively small stomach and long intestines. For this reason he may gulp down his feed, and what is not digested in the mouth will have plenty of time to be digested in the intestines.

Kafir-corn meal has proven to be a superior feed for calves. It seems to be constipating, and materially assists in checking the tendency to scours, so common with calves. Experiments at the Kansas Station show that calves will begin eating shelled corn when three to four weeks old and will do as well and even better than when fed corn chop. When possible it is desirable to feed a mixture of shelled corn and ground Kafir-corn. Soy beans have been tested at the Kansas Experiment Station as a calf feed, and all results indicate that they are not adapted to young calves in any quantity whatever. They are very loosening and cause scours. Where calves are intended for dairy cows, the grain ration of corn or corn-meal should be changed to include oats and bran or oil-meal whenever they begin to appear fleshy.

FEEDING ROUGHNESS.—Calves will begin to nibble at hay about the same time they commence to eat grain. When from six to eight weeks old, the calves under experiment at the Kansas Agricultural College consumed from one-half to one pound daily per head. Mixed orchard grass and prairie hay are best. Alfalfa hay proves to be too loosening for young calves, though it may be gradually introduced into the ration after from three to four months. Nothing but clean, bright hay should be offered to calves. At times considerable difficulty is experienced from scours when calves are suddenly turned on pasture. This can

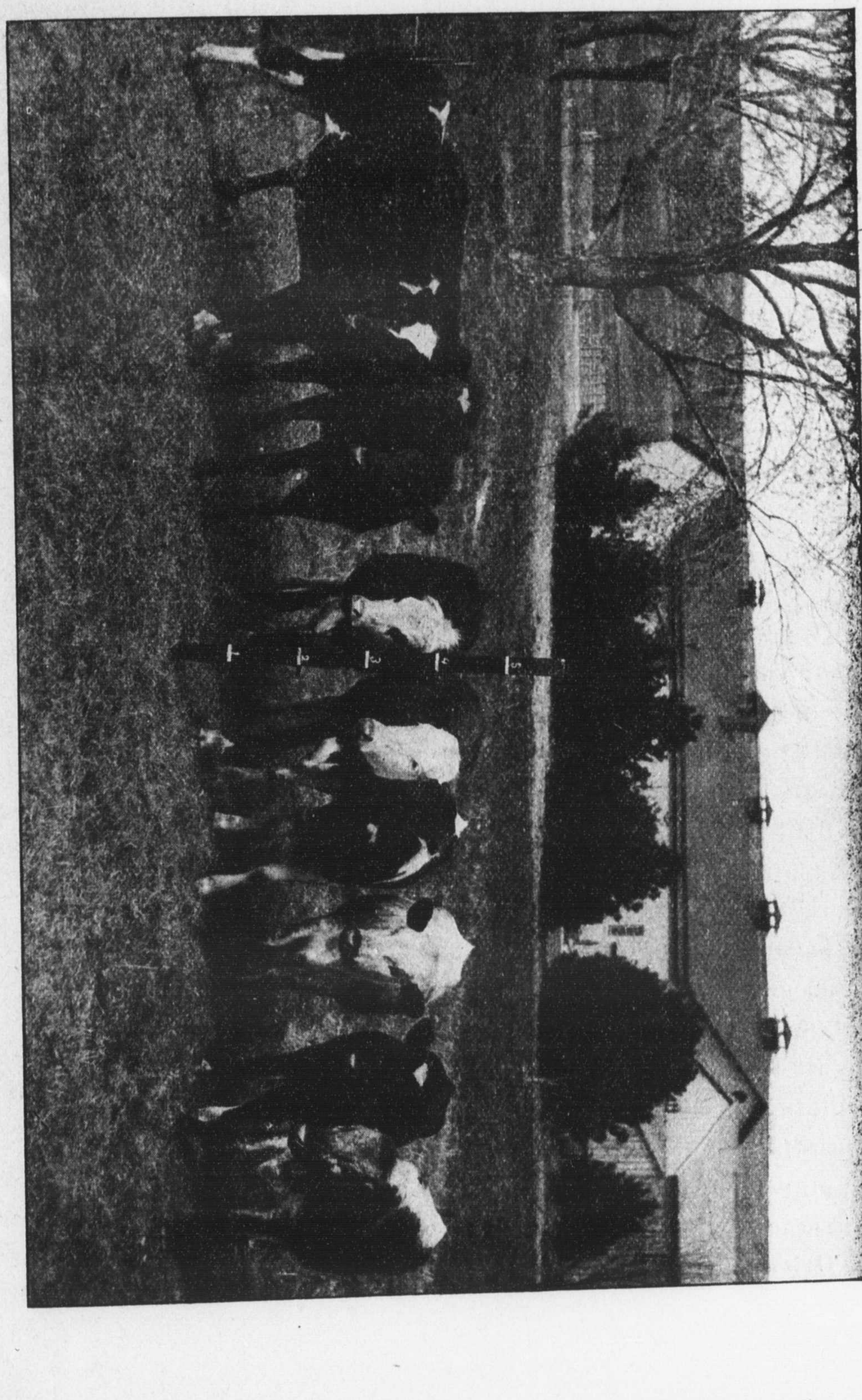
be overcome by feeding a little green feed before making the change. Give a forkful the first feed, two forks full the second feed, and so on until the calves get all the green feed they want, when they can be turned on the pasture without injury.

WATER.—Calves like fresh, clean water. In a trial with thirteen calves, ranging from two to three months of age, it was found that eight hundred sixty-eight pounds of water was drunk in seven days, or nearly ten pounds per day per head. It was noticed that these calves drank several times a day, but sipped only a little at a time. Even after their ration of milk they would take a few swallows of water. An automatic waterer situated a little above the surface of the ground is the best arrangement for supplying this need.

CALF TIES.—The Kansas Experiment Station has tried both ropes and stanchions, and finds that using the latter is the simplest and best means of holding calves while they are being fed. Calves will also learn to eat grain much quicker than when fed in an open pen. With stanchions, each calf finds its place and the feeder can set the milk pail in the feed trough, which prevents its being tipped over, and while the calf is drinking can measure out the milk for the next calf. In this way it is possible for a man to keep three or four pails going, until all the calves are fed. If grain is put into the feed trough at once the calf will go to eating, and forget about its friendly, but impolite and unsanitary affection for its neighbors ears or mouth. Calves fed in this way can be let loose again fifteen minutes after entering the stanchions. The Agricultural College has found that excellent stanchions for calves can be made out of plain fencing for the upright pieces, with two-by-fours for the horizontal pieces at the top, with fencing boards at the bottom. The stanchions are forty-two inches high, twenty-eight inches apart from center to center, and allow for four and one-half inches space for the neck. The feed trough is twelve inches wide, four inches deep, and runs the full length of the stanchion. If calves are fastened by rope ties, they should be far enough apart to prevent them from sucking each other.

SCOURS.—The greatest difficulty in raising calves is undoubtedly scours. Here, as elsewhere, "An ounce of prevention is worth a pound of cure." The principal causes are overfeeding, feeding sour milk, feeding cold milk, feeding grain with the

milk, dirty milk pails, unwholesome feed boxes, and irregularity of feeding. An intelligent and observing feeder will notice the symptoms of this disease as soon as it appears, in which case the ration of milk should be cut down one-half or more and gradually increased again as the calf is able to stand it. A successful feeder will do his best to keep the milk sweet. When sterilized skim-milk is brought back from the creamery, the portion in-



A DAIRY CHOIR.
Skim-milk heifers raised for the dairy. Average weight, 564 pounds at one year old.

tended for that night's feed will usually keep in good condition without any treatment. The portion intended for the next morning's feed or the following feeds (where milk is kept over Sunday or hauled to the creamery every other day) needs to be cooled down to 60 degrees F. or less as soon as it arrives from the creamery. Complaints are sometimes received about sterilized skim-milk souring when placed in tubs of cold water as soon as received from the creamery. Sterilized skim-milk will not sour until it is cooled to about blood temperature. A can of hot milk will warm a tub of water to about this temperature, and as the milk is cooled at the same time, the best conditions are offered for the development of lactic-acid germs. In this case a tub of water only helps to keep the tub of milk at blood temperature. Under such circumstances the water is worse than nothing. If hot skim-milk is cooled in the tub, it should be done by running water. A better plan is to use a cooler, and place the can of cooled milk in a tub of cold water in order to keep it cool.

Skim-milk treated in this way at the Kansas Agricultural College has been kept sweet from Saturday forenoon until Monday morning, during the hottest months of the summer, without the use of a particle of ice, the cooling being done with well water. Where trouble is experienced when skim-milk is cooled and kept below 60 degrees, the fault probably lies in using unclean utensils, or by the creamery using tainted or sour milk, or by the skim-milk being improperly sterilized. The heating of the milk tends to produce chemical changes that help to prevent scours. There is probably no more effective way of upsetting the system of the young calf than by feeding it cold milk. So important is it always to feed the milk at blood temperature (95 to 100 degrees F.) that a careful feeder will occasionally test the temperature with a thermometer. No one can expect to successfully raise skim-milk calves without giving close attention to the temperature of the milk when fed.

The feeding of the grain with the milk has already been mentioned in detail. Calf buckets may be kept clean by rinsing and scalding after each feed. No more grain or hay should be fed than the calves will eat up clean. Should any remain uneaten, it should be removed before giving any fresh feed. Calves like salt the same as any other animal.

Dried blood has been found to be an effective remedy for

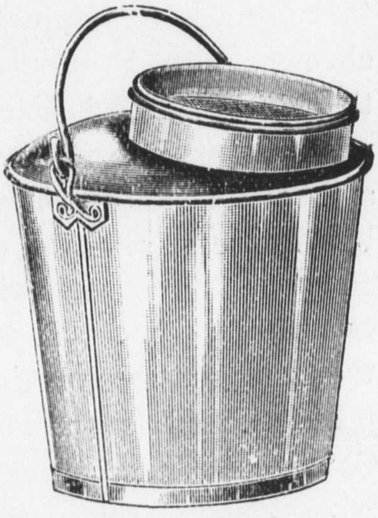
scours. Mix a teaspoonful with the milk while the calf is drinking. In case of a weak calf the allowance may be increased gradually to a tablespoonful at each feed.

To summarize, warm, sweet milk, fed in clean buckets, with access to corn-meal or Kafir-corn meal, bright hay, fresh, clean water, salt, plenty of sunlight, shelter and bedding in cold weather, shade in summer, and regularity and kindness in treatment will usually insure good, thrifty calves that will gain from a pound and one-half to two pounds daily. D. H. OTIS.

A MILK TRIP AT THE KANSAS AGRICULTURAL COLLEGE.

IN preparing for the trip every effort is made to keep the stables clean, the stalls well bedded, and to have as little dust floating at the time of milking as possible. To accomplish this latter point, the feeding is done after, rather than before, the milking. The handling of the hay, ensilage, or even grain, fills the atmosphere full of dust and carries with it millions upon millions of germs, many of which will fall into the milk, and not only cause it to sour, but will develop undesirable flavors in the butter and cheese made from it. The hay bacillus, a germ that has great tenacity of life, exists in immense quantities in cured hay, and when allowed to develop unchecked in ripening cream will cause the butter to have a very disagreeable, offensive flavor.

Before beginning to milk, each milker sees that his hands are clean; not merely that they look clean, but that they are as free as possible from germs. For this purpose it is often necessary to wash in as hot water as the hands will bear, previous to milking. Each milker is provided with a canton flannel cloth, which is moistened and used to wipe off the sides and udder of the cow. This removes the loose particles of dust and moistens the rest so that they will not so readily fall into the milk bucket. These cloths, as well as the cloth strainers, are thoroughly washed and sterilized with boiling water after each milking.

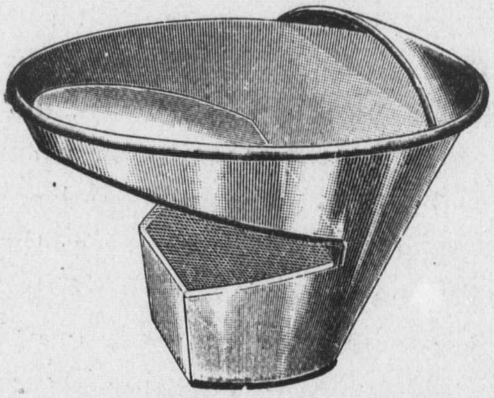


SANITARY MILK PAIL.

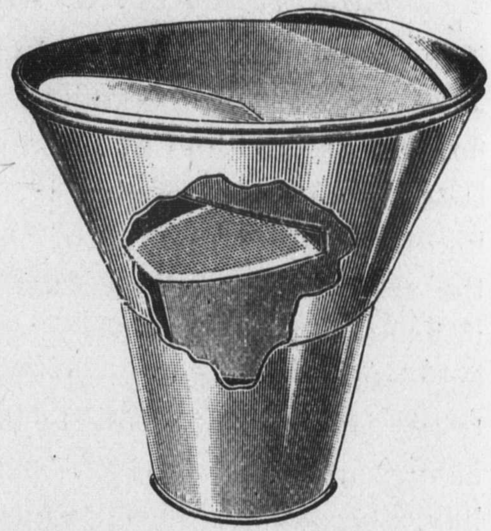
The milk pail used, called the "sanitary milk pail," is made of

heavy tin and, as will be seen from the accompanying cut, is covered at the top. In this cover is a six-inch hole, into which fits a circular removable strainer.

The milk is drawn directly into this strainer. This style of milk pail keeps out of the milk the dust and hairs that fall in spite of the precautions already mentioned. Anyone doubting the desirability of such a pail need doubt no longer, after once seeing the appearance of the pail after milking. In spite of the best precautions, the top of the pail will be covered with numerous hairs and dust particles, enough to spoil the digestion of any man if he only knew what he was swallowing when he drinks milk out of an open top milk pail.



UPPER PRESSURE MILK STRAINER (Fig. 1).

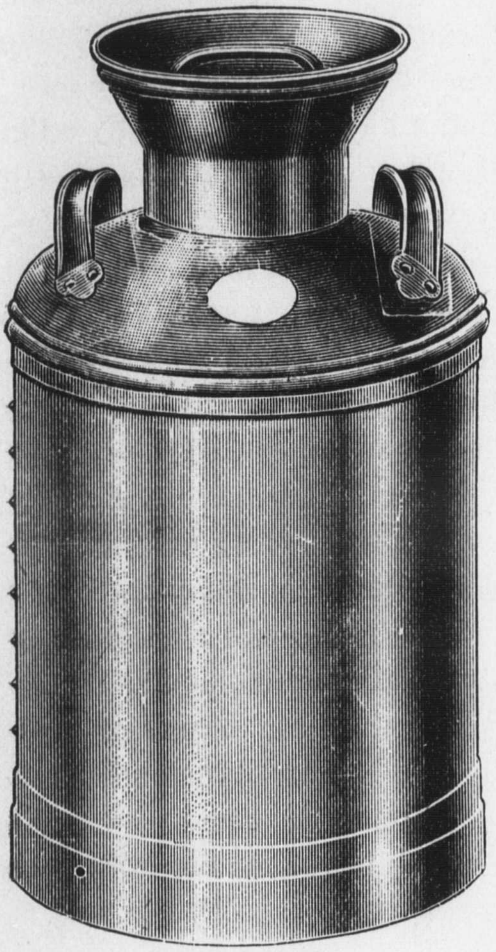


UPPER PRESSURE MILK STRAINER (Fig 2).

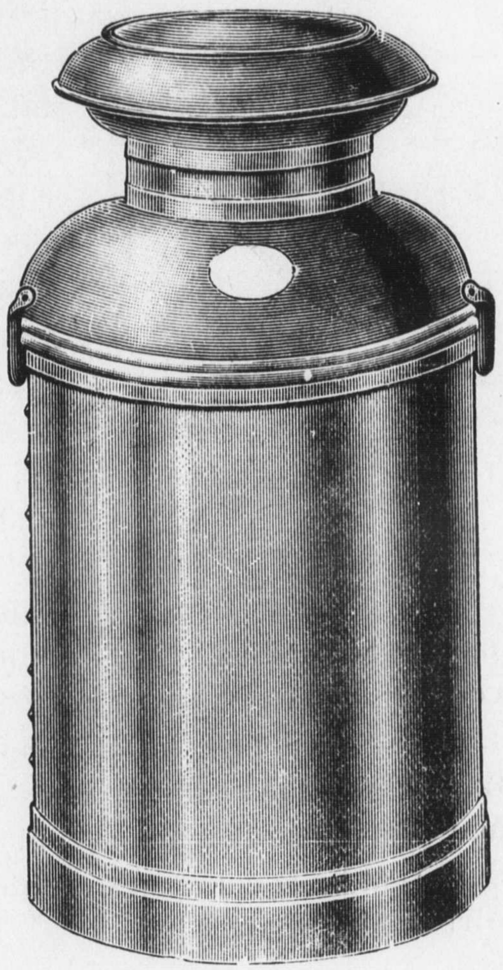
Each cow's milk is weighed, sampled, and again strained through a wire strainer, and finally through four thicknesses of cheese cloth. From the accompanying cut, it will be noticed that the wire strainer is so constructed that the milk is strained on an upward pressure. Any particles of dirt remaining in the milk and settling to the bottom will not be forced through the strainer by the pressure of the milk above.

From the cheese-cloth strainer the milk is received into forty-quart milk cans. We have two styles of cans, the New York and the Chicago. We prefer the former for two reasons. In the first place, the lid is oval and will not collect dust like the lid of the Chicago can, and can be cleaned much easier. In the second place, when it is desired to keep the milk any length of time, the New York can can be immersed in water. The lid projects below the top of the can and the pressure of the air inside keeps the water from the milk, on the same principle as the cans of the Cooley creamer.

The milk is brought to the dairy room as soon as possible after being milked and strained, and is aerated, a half a can at a time, with the Hill aerator.



CHICAGO CAN.

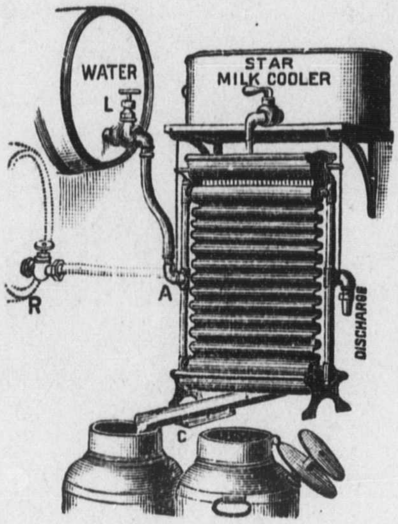


NEW YORK CAN.

A tin pipe projects above the roof of the dairy room, where fresh air is secured and conducted through absorbent cotton (to remove any germs or dust particles) into bellows, by which it is forced through the milk. Any one standing near the can of milk while this operation is being performed cannot fail to notice the cowy odor that is given off. This is kept up until the animal odor is removed. In this way nearly all the taints in milk, not due to germs, can be removed, and it has been found by experience that milk is much more desirable after being aerated. After aeration the milk is cooled over a Star milk cooler to between fifty and sixty degrees F., at which temperature it is kept until delivered to the College creamery. When separation takes place immediately after milking, the milk goes directly from the aerator to the separator without being cooled.

To some, and perhaps to many of our readers, this milk trip may appear long and tedious, but practical experience has proven that after once accustomed to it much of this work can be done in less time than it takes to tell it, and the difference in the quality of the milk is the difference between pure, wholesome milk and dirty, filthy milk. Straining through wire and cloth will not take out the dirt that has once become dissolved in the mi k, nor will it remove the taints that arise from the feed. A man may have the right to use filthy and dirty milk if he wants to, but the consumers of both milk and its products also have a right to enter a vigorous protest against this same man selling his filthy milk as a pure food product. Milk adulterated with filth and dirt is to be condemned even more than butter adulterated with oleomargarine. Both are deceiving the customers. While the dairyman is protesting against the manufacture and sale of oleomargarine as butter, and every true dairyman should be, let him at the same time make sure that he is not open to criticism by adulterating his milk with dirt or filth of any kind.

D. H. OTIS.



STAR MILK COOLER.

HOW THE DAIRY HERD IS FED AT THE AGRICULTURAL COLLEGE.

COUNTING THE COST.—The Kansas Agricultural College and Experiment Station is trying to perform a double mission in feeding milch cows; first, to carry on experiments to ascertain facts and figures that will be of benefit to the dairy farmers of the State. This kind of experimenting is sometimes expensive. For instance, last summer scores of inquiries reached us in regard to what to feed. In many places wheat and wheat straw were the only feeds available. To intelligently answer these questions a part of the dairy herd was taken from a sorghum pasture, where the cows were being fed successfully and economically, and drafted into an experiment to ascertain the possibilities of maintaining the milk flow on wheat straw, ground wheat and cottonseed-meal. Isolating these cows from the rest of the herd and keeping accurate records of feed con-

sumed was not as profitable as leaving them on sorghum pastures, but the results obtained before the winter season set in and published in press bulletin No. 106, for the benefit of the dairy farmer, more than justified the extra expense to the Station. Again, numerous inquiries ask for the best breed of dairy and dual-purpose cows. The Department of Dairy Husbandry at the College is milking every pure-blood cow that freshens on the College grounds in order to ascertain the possibilities of the different breeds in milk production. Several cows are being milked at a loss in order to complete the experiment. Second, the Agricultural College is endeavoring to develop common, grade and pure-bred cows to the highest notch of economical production, and it is along this line that this article deals especially. To accomplish this purpose it is necessary that the cows be supplied with those feeds that will enable them to produce the largest amount of milk and butter fat at the least possible cost for feed consumed. This calls for a knowledge of the relative value and cost of different feeds. The following table has been used by the Agricultural College as a guide in the selection of feeding stuffs:

COMPARATIVE VALUE OF FEEDS.

ROUGHNESS.—Value per ton, when alfalfa is worth $1 per ton.		
FEED.	Total nutrients.	Protein nutrients.
Dry Roughage:		
Alfalfa	$1 00	$1 00
Corn fodder	32	19
Cow peas	97	1 02
Fodder corn	40	24
Millet	64	42
Oat hay	59	41
Oat straw	33	15
Orchard grass	60	45
Prairie hay	51	33
Red clover	70	64
Sorghum	43	23
Soy beans	98	1 02
Mixed hay	67	56
Timothy	47	27
Wheat straw	25	08
Green Roughage:		
Alfalfa	34	37
Corn silage	13	12
Fodder corn	14	09
Pasture grasses	23	24
Sorghum fodder	12	06
Soy bean	28	30
Roots and Tubers:		
Mangels	10	09
Sugar beets	14	10
Turnips	11	08

GRAINS AND BY-PRODUCTS.—Value per 100 lbs., when corn is worth 10 cts. per 100.		
FEED.	Total nutrients.	Protein nutrients.
Concentrates:		
Barley	$0 10	$0 11
Broom-corn seed	08	09
Corn	10	10
Corn-and-cob meal	07	08
Cow peas	15	23
Cottonseed hulls	02	003
Cottonseed-meal	28	47
Flax seed	18	26
Chicago gluten meal	21	40
Kafir-corn seed	09	10
Linseed meal	22	37
Millet seed	09	11
Oats	09	12
Rye	11	12
Sorghum seed	08	09
Soy bean meal	23	38
Wheat	11	13
Wheat bran	10	16
Wheat middlings	12	16
Wheat shorts	11	15
Milk:		
Whole milk	03	04
Skim-milk	02	05
Whey	008	01
Buttermilk	03	05

For ease of calculation, the roughness in this table is figured on the basis of alfalfa hay selling at $1.00 per ton. When alfalfa is worth $6.00 per ton the other rough feeds are worth six times the amount indicated in the chart. When alfalfa sells for $8.00, then the other feeds are worth eight times as much, and so on. The same principle applies to the grains with corn at ten cents per hundred pounds as the basis. In years of abundant crops we usually have plenty of feeds that furnish carbohydrates and fats, but are short of protein feeds. In this case we can tell what is the cheapest feed to purchase by consulting the second column, headed "Protein Nutrients."

FEEDING ROUGHNESS.—Usually we give all the rough feed the cows will eat, although with a good quality of alfalfa hay the cows will sometimes overeat even on roughness. At present alfalfa hay is selling in Manhattan at $10 per ton. This would make the relative feeding value of the other rough feed worth ten times the amount indicated in the chart. In comparison, red clover hay would be worth $7.00 per ton, prairie hay $5.10 per ton, corn fodder $3.20 per ton, millet $6.40 per ton, and sorghum hay $4.30 per ton, all of which are selling above their feeding value compared with alfalfa. Alfalfa and prairie hay, for instance, are commanding the same price on the Manhattan market. It is evident, then, that for dairy cows alfalfa is the more economical hay. During the month of January the College herd received an average of about thirty pounds of alfalfa hay daily per head. While this supply of hay is large it has been the means of reducing the amount of grain necessary to keep up the milk flow. The College had a little Kafir-corn fodder on hand and from time to time a little of this was fed to add variety to the ration. While the weather was warm the hay was fed in the yard both day and night, but whenever the weather was cold or stormy the hay was fed in the barn.

FEEDING GRAIN.—The comparative value of the different grain feeds are also given in the above table. Since alfalfa hay is rich in protein we look not for concentrated protein grains like oil meal or cottonseed meal to feed with it, but for grains that contain a large per cent of carbohydrates, as corn, Kafir corn, sorghum seed, oats, wheat, and wheat bran. Of this list wheat bran is the cheaper per hundred pounds during the fall and winter of 1901-02, and although it contains more protein than the cow

needs in connection with alfalfa, yet it is the most economical grain that we can buy. Unlike roughness, the amount of grain fed varies with the individuality of the cow. Some of our cows are receiving eight pounds per day while others are receiving none. The aim is to give to each cow just what grain she will handle at a profit for total feed (hay and grain) consumed. To determine this point we have found a daily milk record indispensable.

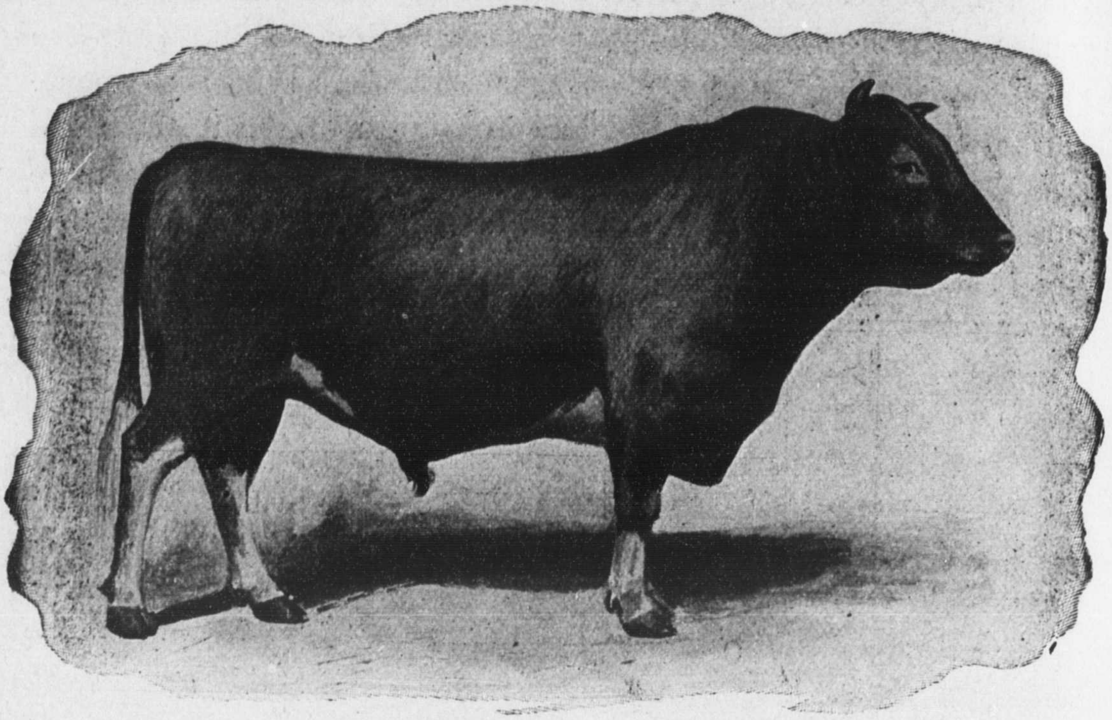
MILK RECORD.—MONTH.............................1902.

Cows.	Milking.	Day of Month. 1	2	3	(Include all days of month.)	30	31	Total.
Miss Ita..........	a. m.	9.7	9.8	10 2	....	9.5	8.8	561.1
	p. m.	9.3	7.9	8.5	....	6.0	7.3	
Countess Vesta.	a m.	10.8	10.0	11.2	....	11.1	11.5	658.3
	p. m.	11.6	8.3	11.9	....	8.6	5.9	
Juno..........	a. m.	9.0	10.1	8.5	....	8.8	8.4	507.7
	p. m.	7.7	7.5	8.1	....	5.2	6.6	
....	....	......	......	......	....	......	......	......
....	....	......	......	......	....	......	......	......

By knowing the test and watching the milk record carefully we can very soon tell what effect an increase or decrease in the feed may have upon any individual cow and we may vary the feed accordingly. The experience of the Kansas Agricultural College shows that one cow will produce butter fat at ten and eleven cents per pound for feed consumed and another by her side will charge twenty four cents per pound. Without a milk record much costly feed will be wasted on cows that will not make adequate returns for it.

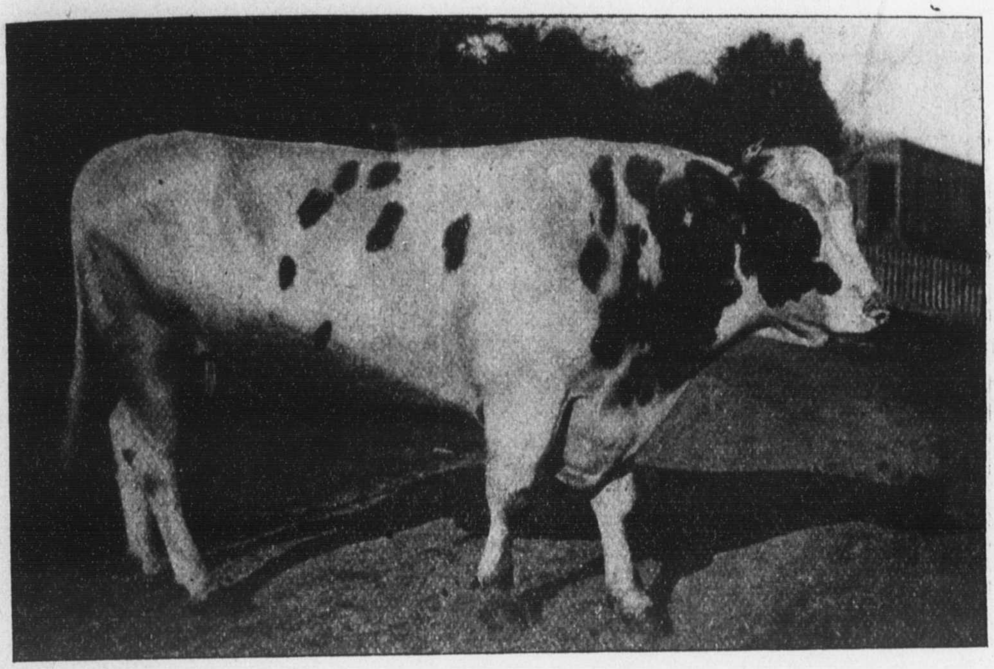
D. H. OTIS.

No matter how well formed a cow we may have, or how good that cow may be individually, we may ruin her as a milch cow if we do not give her proper surroundings. We are told that the primitive horse went down into the lower Rhine, where food was plenty and conditions favorable, and we have developed the large, heavy Flanders horse. The primitive horse went down into western Asia, where the climate was dry, and food less plentiful, and we have a different type of horse, namely the running and spirited Arabian. It has been under conditions similar to these, but perhaps more intensified, that our different breeds of live stock have been developed. The cow is no exception to the rule.



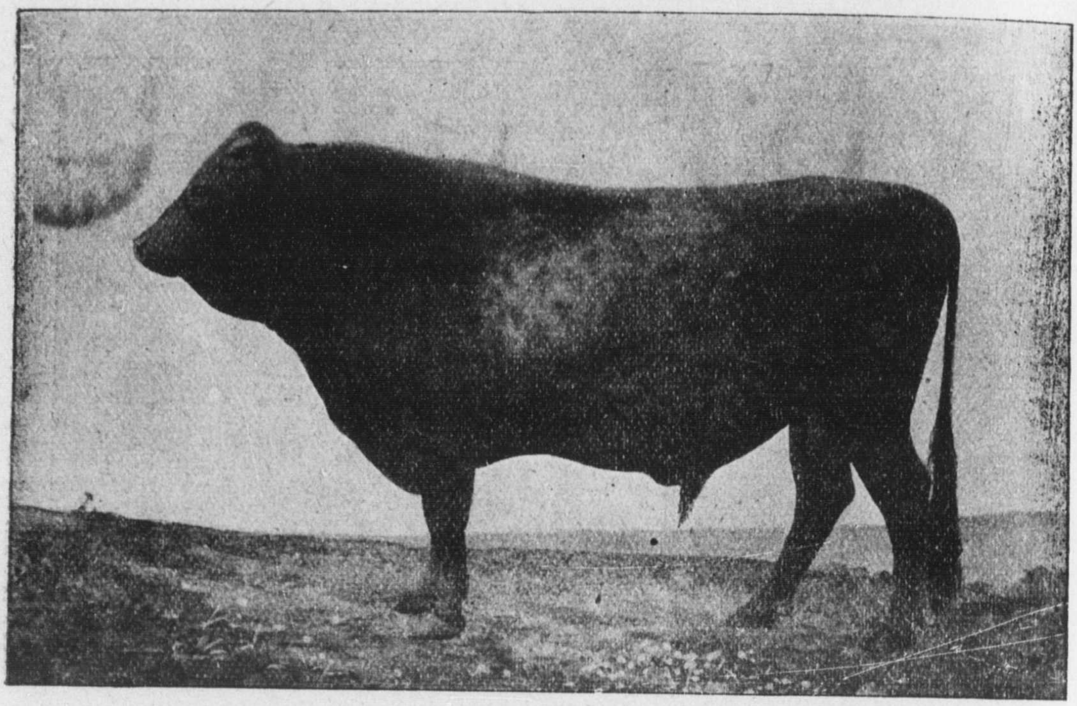
A TYPICAL GUERNSEY BULL.
Imported Lord Stranford 2187, A. G. C. C.

A TYPICAL GUERNSEY COW.
Rutila's Daughter 6670, A. G. C. C.

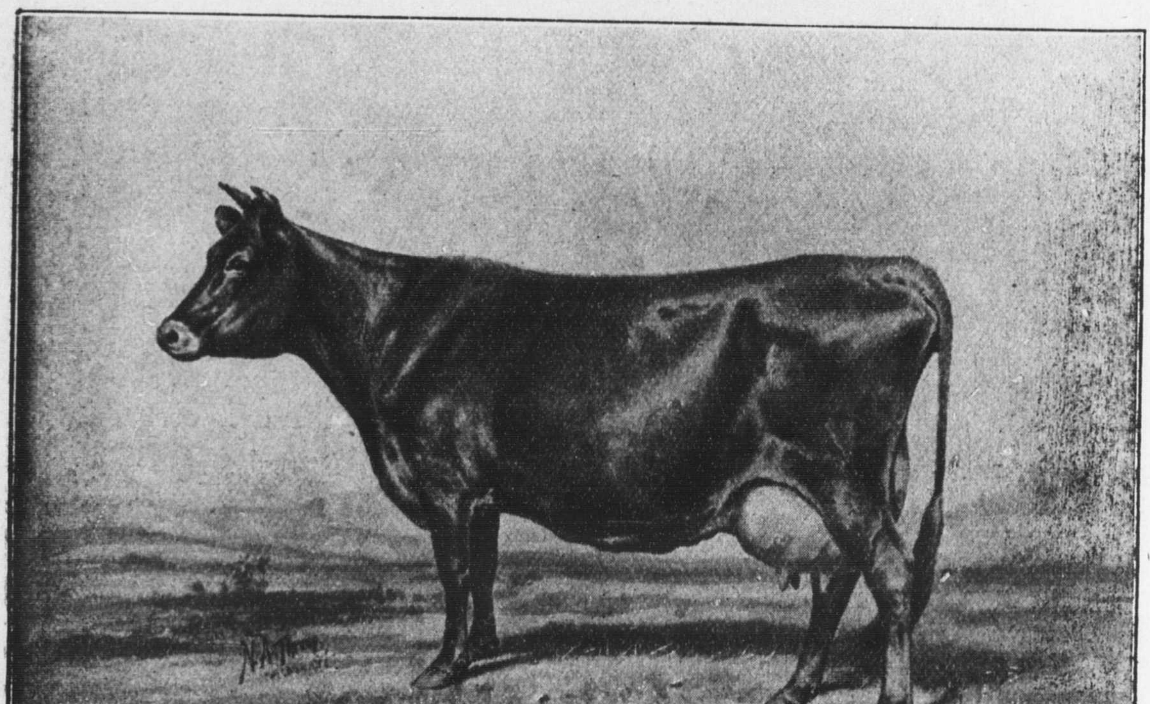


A TYPICAL HOLSTEIN-FRIESIAN BULL.
White Ondinus Shepard 19929.

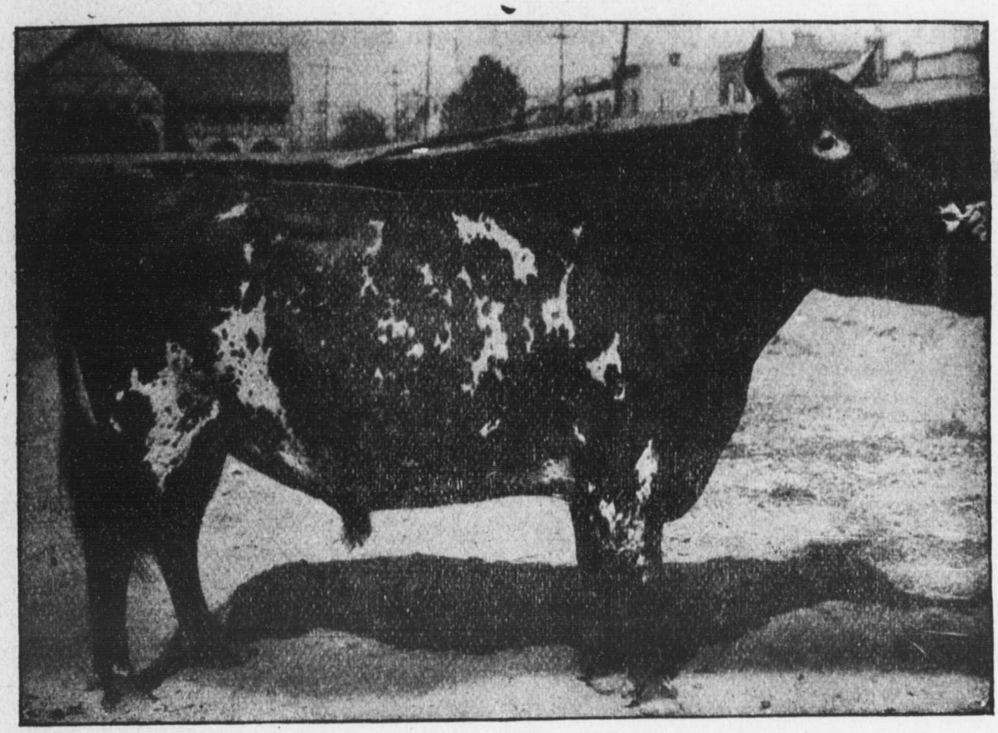
A TYPICAL HOLSTEIN-FRIESIAN COW.
Melisse Clothilde 37371.



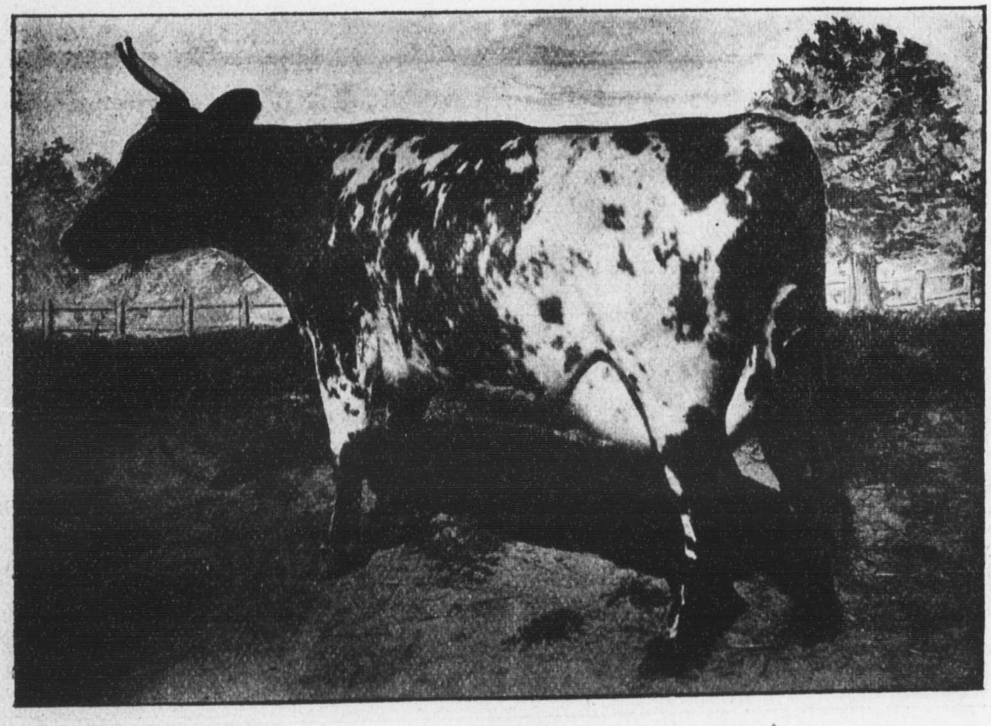
A TYPICAL JERSEY BULL.
Recorder 29239.



A TYPICAL JERSEY COW.
Brown Bessie 74997.



A TYPICAL AYRSHIRE BULL.



A TYPICAL AYRSHIRE COW.

PROGRAM.

Kansas State Dairy Convention, Manhattan, March 4 to 7, 1902.

Tuesday Evening, March 4, 7:30 o'clock.

In College Chapel.

Music.

President's Address, - - - - - - - - - - - E. C. Lewellen
Newton, Kan.

Music.

Secretary's Report, - - - - - - - - - - - - - T. A. Borman
Topeka, Kan.

Ensilage: Its Value to Dairymen and Stock Growers, - - - - - - E. N. Cobb
(Buff Jersey.) Monmouth, Ill.

Music.

New Basis Upon Which Farm Separator Cream is Bought, - Prof. E. W. Curtis
Council Grove, Kan.

Wednesday Morning, March 5, 9 o'clock.

Music.

The Use of Dairy Products in Cooking, - - - - Prof. Edith A. McIntyre
Manhattan, Kan.

The Relative Value of Feeds, - - - - - - - - - E. B. Cowgill
Editor of *Kansas Farmer*, Topeka, Kan.

Music.

Silos: How to Build Cheaply, How to Fill. What to Fill With, - - - E. N. Cobb
(Buff Jersey.) Monmouth, Ill.

Wednesday Evening, March 5, 7:30 o'clock.

Music.

Dairying in Europe, - - - - - - - - - - Major Henry Alvord
Chief Dairy Division, U. S. Bureau of Animal Industry, Washington, D. C.

Address, - - - - - - - - - - - - - - S. E. Bassett
Deputy Food Commissioner, Lincoln, Neb.

Thursday Morning, March 6, 9 o'clock.

(Skimming-Station Operators' Session.)

Music.

The Dairy Student After He Leaves College, - - - - - - Prof. D. H. Otis
Manhattan, Kan.

The Skimming Operator: What He Is and What He Should Be, - - F. L. Huxtable
Wichita, Kan.

Music.

Examination: Station Operators' Class, - - - - - - W. H. McKinstry
Topeka, Kan.

Pasteurization and its Relation to Kansas Dairying, - - - Prof. Ed. H. Webster
Manhattan, Kan.

Music.

Butter for European Market, - - - - - - - - Prof. G. L. McKay
Ames, Iowa.

Thursday Evening, March 6, 7:30 o'clock.

(Dairy Students' Session.)

Music.

Evolution of the Dairy Cow, - - - - - - - - - N. L. Towne

The Diet of the Kansas Dairy Cow, - - - - - - - - Carl Elling

The Ups and Downs of the Babcock Test, - - - - - - - D. Holloway

Music.

Where Does Kansas Come In? - - - - - - - - - W. H. Olin

What Shall We Do With the Skim-milk, - - - - - - - John Griffing

The Possibilities of a Private Dairy, - - - - - - - G. W. Loomis

Music.

Dairying Illustrated, - - - - - - - - - - E. W. Simpson

Contest of Dairy Short-course Students in Skimming Station Management.

Friday Morning, March 7, 9 o'clock.

Music.

Crop Rotation, - - - - - - - - - - Dr. Henry Wallace
Des Moines, Iowa.

Growing and Feeding Alfalfa, - - - - - - - - - H. D. Watson
Kearney, Neb.

Music.

How Profits in Kansas Dairying May be Doubled, - - - - Prof. H. M. Cottrell
Manhattan, Kan.

Friday Afternoon, March 7, 1:30 o'clock.

At College Barn.

(Before the Dairy Stock-Judging School.)

The True Type of a Dairy Cow (living illustrations), - - - - Prof. A. L. Haecker
Lincoln, Neb.

Dairy Students' Contest in Stock Judging.

Friday Evening, March 7, 7:30 o'clock.

Music.

Due West; or, Around the World in 192 Days, - - - - - - J. E. Nissley
Topeka, Kan.

Music.

Address, - - - - - - - - - - - Dr. Henry Wallace
Des Moines, Iowa.

Presentation of Prizes to Short-course Dairy Students.

Contestants in Butter Making: J. A. Ambler, R. P. Arnold, G. Eastman, A. Goatley, H. P. Goodell, C. J. Griffin, W. H. Howard, P. Leiser.

Contestants in Butter Scoring: E. Adams, J. O. Ambler, A. Mantz L. R. Manley, A. H. McManis, S. H. Remington, R. Taylor, M. W. Wheeler.

Contestants in Skimming-station Management: C. M. Clark, C. F. Eldredge, J. O. French, G. W. Hunt, J. E. Jobe, P. W. Keys, R. L. Payton, C. F. Thestrup.

Contestants in Stock Judging: J. W. Bigger, H. R. Blair, C. T. Bull, W. C. DeSelm, W. A. Hamilton, T. E. McClelland, C. A. Peairs, C. C. Winsler.

Music will be furnished by the College Band, College Orchestra, Mandolin Club, Dairy Octette, Quartettes from the College Literary Societies, and other members of the Musical Department.

The association will hold no afternoon meetings. This will give all members an opportunity to attend the dairy stock-judging school which will be in session each afternoon of the week, March 3 to 8, inclusive. The stock-judging school is conducted by the Kansas Agricultural College and all members of the Dairy Association will be admitted to the classes free, and are invited and urged to attend. Before the school a number of prominent judges will appear. Among the number will be: H. W. Cheney, Topeka, Kan., E. N. Cobb, Monmouth, Ill., Prof. A. L. Haecker, Nebraska Agricultural College, Lincoln, Neb. T. A. Borman will be instructor.

CREAMERIES, SKIMMING STATIONS AND CHEESE FACTORIES.

Compiled by Department of Dairy Husbandry, Kansas State Agricultural College, Manhattan, Kansas. Italics indicate churning points. Corrected to March 1, 1902.

Acme Creamery Association.—*Acme*, Bonacord.

Admire Creamery Company.—*Admire.*

Allen Cheese Factory.—*Allen.*

Armstrong, C. F.—*Clyde*, Brantford, Clifton, Concordia, Day, Huscher, Talmo.

Arkansas City Creamery Company.—*Arkansas City*, Ashton.

Alspaugh Bros.—*Floral*, Atlanta, Burden, Cambridge, Latham, Tisdale.

Basehor Creamery.—*Basehor.*

Beatrice Creamery Company.—*Lincoln, Neb.* Kansas stations: Atwood, Baker, Barnes, Bern, Blue Rapids, Bremen, Cuba, Haddam, Hanover, Herndon, Long Island, Luctor, Morrill, St. Francis, Washington.

Belle Springs Creamery Company.—*Abilene*, Appleville, Beverly, Bormer City, Brookville, Chapman, Culver, Dayton, Dillon, Donegal, Ellsworth, Frederick, Geneseo, Gypsum City, Holland, Ladysmith, Longford, Lorraine, Moonlight, Navarre, Niles, Rhinehart, Salina, Talmage, Tescott, Trudell, Upland.

Beveridge, Jas.—*Keats.*

Big Springs Cheese Company.—*Big Springs.*

Blue Mound Creamery Company.—*Blue Mound*, Centerville, Creitzer, Bush City, Kossuth.

Blue Valley Creamery Company.—*St. Joseph, Mo.*, Marysville, Home City.

Bowser, G. R.—*Circleville*, Goffs.

Brady-Meriden Creamery Company.—*Kansas City, Mo.*, Boyle, Cadmus, Dunavant, Easton, Eudora, Kincaid, Lanisburg, McLouth, Meriden, Neodesha, New Lancaster, Rock Creek, Valley Falls, Winchester.

Bull, John (cheese).—*Cimarron.*

Burlington Creamery Company.—*Burlington*, Gridley.

Cawker Creamery Company.—Cawker City, Dispatch.

Cedar Vale Creamery Company.—*Cedar Vale.*

Continental Creamery Company.—*Topeka*, Auburn, Asherville, Aeroma, Ada, Augusta, Aurora, Americus, Berryton, Barclay, Bala, Brewster, Belleville, Benton, Beloit, Blue Hill, Bendena, Buckeye, Bridgeport, Beeler, Burdick, Bennington, Beaver Valley, Bogne, Carbondale, Clay Center, Coal Creek, Comiskey, Conway, Canton, Colby, Carlton, Cunningham, Cottonwood Falls, Centralia, Caldwell, Denmark, Dunlap, Detroit, Dresden, Dover, Downs, Douglass, Enterprise, Elyria, Elmdale, Emporia, Erpelding, Everest, Effingham, Fuller, Formoso, Fairview, Fact, Galva, Goddard, Garfield, Glasco, Gaylord, Greenleaf, Gem, Hartford, Hill City, Horton, Hoyt, Herington, Humboldt, Hoxie, Irving, Idana, Industry, Jamestown, Jewell City, Jennings, Kirwin, Kipp, Kensington, Kanarado, Lecompton, Lenora, Leon, Lehigh, Little River, Lincoln, Linn, La Crosse, Langdon, Leonardville, Louisville, Lost Springs, Luther, Lyndon, Lindsay, Lamar, Lucas, Levant, Latimer, McPherson, Menno, Michigan Valley, Marvin, Mound Ridge, Mount Hope, Milton, Munden, Mankato, Meredith, Mayview, McCracken, Mound City, Mound Springs, Moreland, Mulvane, Manchester, Miltonvale, Narka, Norwich, Norway, Neosho Rapids, Ness City, New Murdock, Oak Hill, Osage City, Oskaloosa, Olsburg, Osborne, Onaga, Phine, Potter, Phillipsburg, Peck, Plainville, Portis, Pontiac, Parallel, Palco, Paxico, Ramona, Roxbury, Riverdale, Rossville, Rhinehart, Ransom, Riley, Riverside, Rosalia,

Rose Hill, Saffordville, Selden, Scandia, Stuttgart, Sylvan Grove, Stockdale, Sharon Springs, Saltville, Scottsville, Sunflower, Speed, Stockton, Smith Centre, Strickler, Shady Brook, Solomon City, Sudyville, Tampa, Thompsonville, Turkey Creek, Turon, Utica, Victor, Vassar, Wichita, Waldo, Whiting, West Branch, Wakefield, Walsburg, White House, White City, Woodbine, Zenda.

Curtis, E. W.—*Council Grove*, Wilsey.

Diamond Creamery Company.—*Pittsburg*, Arma, Brazilton, Opolis, St. Paul, Walnut

Dutt & Co.—*Birmingham*, Denison, Half Mound, North Cedar.

East & Wolf.—*Marion*, Elk, Plazen, Stenzel, Youngtown.

Edna Creamery Company.—*Edna*.

Egbert, W. W.—*Carman*.

Elk City Creamery Company.—*Elk City*, Arlington, Larkin.

Erie Creamery.—*Erie*, Shaw.

Eskridge Creamery Company.—*Eskridge*.

Eyth, G. A.—*Barnard*.

Farlington Creamery Company.—*Farlington*.

Forest Park Creamery Company.—*Ottawa*, Baldwin, Briles, Centropolis, Clearfield, Colony, *Edgerton*, Gardner, Garnett, Halls Summit, Homewood, Hoods, Lane, LeLoup, McCandlass, Mt. Ida, Norwood, Pioneer, Pleasant Hill, Prestonville, Prairie Center, Rantoul, Quenemo, Vassar, Waverly, *Wellsville*.

Fort Scott Butter Company.—*Fort Scott*, Branson, Deerfield, Fulton, Harding, Hepler, Hiattville, Mapleton, Pawnee, Redfield, Uniontown.

Fulton Creamery Company.—*Fulton*, Mapleton.

Funk, H. C.—*Durham*, Alvine, Schrader.

Garber, B. N.—*Holton*.

Girard Creamery Company.—*Girard*.

Greeley Creamery Company.—*Greeley*.

Harper Creamery Company.—*Harper*, Anthony, Attica, Argonia, Dequoin, Hazelton, Milan, Nashville, Sharon, Spivey.

Haven Creamery Company.—*Haven*.

Heizer Creamery Company.—*Heizer*, Albert, Alexandria, Bazine, Bison, Hodgeman, Francis, Pawnee Rock, Rush Center, Timken.

Hesston Creamery Company.—*Newton*, Bently, Burrton, Buhler, Ebenfeld, Elbing, El Dorado, Furley, Goessel, Halstead, Hesston, Kechi, *Peabody*, Potwin, Rock Springs, Sand Creek. *Sedgwick*, Severy, Sunnydale, Trousdale, Towanda, Whitewater.

Highland Butter and Cheese Company.—*Highland*.

Hope Creamery Company.—*Hope*.

Hillsboro Creamery.—*Hillsboro*, Aulne, Canada, Menno.

Hutchison, C. F. (cheese).—*Bellaire*.

Independence Creamery Company.—*Independence*.

Iola Creamery Company.—*Iola*, Moran.

Kerr, W. J.—*Palmer*.

Killyon, Elmer (Cheese).—*Eminence*.

LaCygne Creamery Company.—*Paola*, Block.

Leavenworth Dairy and Creamery Company.—*Leavenworth*, Denison, Jarbola, Kansas City, Kan., Kickapoo, Standish, Winchester.

Lebo Creamery Company.—*Lebo*.

LeRoy Creamery Company.—*LeRoy*.

Lincolnville Creamery.—*Lincolnville*, Antelope.
Littlefield, G. H.—*Parsons*, Altamont, Bayard, Dennis, Elsmore, Galesburg, Morehead, Stark, South Mound.
Logan Township Creamery Company.—*Logan Township*, Bushton, Odin.
Lone Star Cheese Company.—*Lone Star*.
Mayetta Creamery.—*Mayetta*.
McCune Creamery Company.—*McCune*, Laneville.
Melvern Creamery Company.—*Melvern*, Olivet, Rosemont.
Merritt, W. G.—*Great Bend*, Claflin, Coal Creek, Hanston, Jetmore, Nekomia, Olmitz, Otis, Shaffer, Boyd.
Neosho Valley Creamery Company.—*Chanute*, Vilas, Leanna.
Nortonville Cheese Manufacturing Company.—*Nortonville*.
Olathe Creamery Company.—*Olathe*, Morse.
Overbrook Creamery Company.—*Overbrook*, Appanoose, Globe, Rock Creek.
Parkman, G. W. & Son.—*Emporia*.
Pearce, W. M. (Cheese).—*Garden City*.
Pleasanton Creamery.—*Pleasanton*.
Parker Creamery Company.—*Hutchinson*, Alden, Andale, Arlington, Basil, Belpre, Buckner, Burdett, Carvel, Castleton, Chase, Ellinwood, Garfield, Inman, Kent, Kingman, Kinsley, Lakin, Lyons, Macksville, Nickerson, Offerle, Peace Creek, Pekin, Preston, Pretty Prairie, Raymond, Saxman, Sego, Silica, Spearville, Stafford, Sylvia, Sterling, St. John, Varner, Wellsford, Wheatland.
Pleasant Hill Cheese Company.—*Chapman*.
Ravanna Cheese Factory.—*Ravanna*.
Reading Cheese Factory.—*Reading*.
Richmond Creamery Company.—*Richmond*.
Rosacker, August.—*Stafford*.
Sabetha Creamery Company.—*Sabetha*.
Schrock Bros.—*Yoder*, Bland, Darlow, Groveland, Maize, Medora, Monitor, Partridge, Sparta.
Schweir, Wm.—*Larned*, Ash Valley.
Scotch Plaine Creamery.—*Belleville*.
Spencer, Henry (cheese).—*Ravanna*.
Spencer. A. B. (Cheese).—Spearville.
Spring Hill Creamery Company.—*Spring Hill*, Bucyrus.
Thayer Cheese Company.—*Thayer*.
Tonganoxie Creamery Company.—*Tonganoxie*, Hodge, Neely.
Troy Creamery Company.—*Troy*.
Walnut Creamery Company.—*Walnut*, Greenbush, Schulz Farm, Porterville.
Walton Creamery Company.—*Walton*, Creswell, Good.
Waterville Creamery Company.—*Waterville*, Afton.
Way, B. R.—*Fredonia*.
Wellington Creamery Company.—*Wellington*, Arkansas City, Haven, Oxford, Perth, Rome, Winfield.

Dry cows and young stock do not need a great deal of shelter. A shed open to the south, situated if possible in a wood lot, will answer the purpose very well. Quarters of this kind will help to develop strong, hearty constitutions, a quality that is just as desirable in dairy as in beef animals. By wintering the dry cows and young stock in an open shed, more time and money can be spent in making comfortable quarters for the milch cows.

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS.......... Editor-in-Chief
PROF. J. D. WALTERS.......... Local Editor
PROF. J. T. WILLARD.......... Alumni Editor

LOCAL NOTES.

Professor Clure was absent from his classes for several days last week on account of sickness.

Four different makes of tank heaters are in active operation at the College barn. Do not fail to see them.

The butter exhibit during the Dairy Association will be in the northwest room of the second floor of the Agricultural building.

Visitors seeking information about board and lodging should consult the Y. M. C. A. information bureau at the Secretary's office or at Park Place.

There are eight separators in our Dairy Department, all except two of these being loaned by their respective manufacturers. All visitors are invited to inspect these separators.

All visitors at the Dairy Association should register. Registration books will be kept at hotel headquarters at Park Place and also at the Secretary's office at the College.

Everyone interested in dairying should not fail to see the nine cows sent to the College by nine prominent dairymen of the State. These cows are very interesting and valuable, as they represent what nine different dairymen consider a good cow for the average Kansas farmer.

The cuts of Campbell's King, Imported Lord Stranford and Rutila's Daughter in this issue of the INDUSTRIALIST were kindly loaned us by Wm. H. Caldwell, secretary of the American Guernsey Club, Peterboro, N. H. The cuts of the Jerseys were loaned by H. C. Taylor, Orfordville, Wis., and those of the Holstein cattle by F. L. Houghton, secretary of the Holstein-Friesian Association of America, Putney, Vt.

From Milford, Geary county, comes the sad news of the death of John B. Gifford. The deceased was a brother of ex-regent C. E. Gifford. He was the land agent of the College from 1883 till 1889, *i. e.*, until all the endowment lands were sold. With his father and brothers, he established the well-known Elmwood herd of Shorthorn cattle, the pioneer thoroughbred cattle herd in Kansas. John B. Gifford had an extensive acquaintance throughout the West. His genial qualities and fellowship made lasting friendships that are monuments of the esteem in which he was held. Some three years ago the deceased became overheated in the hay field, since which time his powerful physique has gradually given away, until the end came on February 22, when he entered the peaceful sleep of the unknown beyond. The remains were placed in the family burying ground at Milford on Monday.

Doctor Mayo was called to a large ranch in Graham county last Saturday, and on Monday was called to Greenwood county to investigate an ailment among cattle. No serious disease was found among the cattle at either place.

Ex-regent Wm. H. Phipps, at present a citizen of St. Joseph, was a welcome visitor at the College last Monday. Mr. Phipps is assistant manager of the Blue Valley Creamery Company, one of the largest creamery concerns in America. He expects to attend the meetings of the Kansas Dairy Association during the first week in March.

Elmer Berry, brother of contractor James W. Berry of the new Physical-Science building, met with a rather serious accident Monday afternoon. In some way the elevator rope became detached and the elevator fell, cutting a gash three inches long in Mr. Berry's head, in which Doctor Lyman took two stitches. It is a great wonder that the accident was not fatal, as the elevator fell twelve feet and it required four men to lift it from Mr. Berry.

It is estimated that there are a hundred millions of prairie dogs in western Kansas. A large number of these live on comparatively worthless land, where no effort will be made to exterminate them, but it will require the killing of at least half of the tribe in order to rid the agricultural districts of the peculiar pest. The College has evidently discovered a practical plan to this end, but it will require many tons of the poison preparation to accomplish it. The prairie-dog laboratory of the College has been kept busy to its full capacity for several weeks and is now running behind in filling the orders which are pouring in from all parts of the State. March 1, orders were unfilled to the number of five hundred fifty cans. Over two hundred pounds of strychnine a nearly equal quantity of potassium cyanide and several tons of sugar syrup were consumed during the past six weeks, and it looks now as if there might be a strychnine famine in this country before long. But the poison is doing its duty with promptness and dispatch. Not a single complaint has been received so far, and many parties who have ordered and used small quantities are writing for more.

ALUMNI AND FORMER STUDENTS

Rev. A. D. Rice, '92, and wife are the happy parents of a son born February 24.

Invitations are out for the wedding of F. J. Rumold, '98. He is to be married Thursday, March 11, to Miss Olive Pitts, of Dillon, Kan.

J. F. Odle, '94, was married to Miss Minnie Hays, of Cedar Creek, Wednesday evening, February 26, at the residence of the bride's parents

J. B. Norton, '97, has resigned his position as assistant entomologist of the Experiment Station and gone to Washington to take a position as scientific aid in the bureau of plant industry of the department of agriculture.

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AGRICULTURAL COLLEGE

☆ ☆ ☆

Editor-in-Chief, - - *Pres. E. R. Nichols*
Local Editor, - - *Prof. J. D. Walters*
Alumni and Former Students, *Prof. J. T. Willard*

☆ ☆ ☆

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THE INDUSTRIALIST.

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THE EXACT CALCULATION OF BALANCED RATIONS.

THE calculation of balanced rations has thus far seemed to be entirely a matter of "cut and try." Their exact calculation has been a mathematical problem which apparently has been found too difficult for solution, or has not been attacked with sufficient persistence. The approximation of the correct figures by guess and trial, followed by another guess or two, is a time-destroying and patience testing process. By the method about to be described, rations can be exactly balanced, with less work, especially if certain factors which are constant for each feed are known. A rule for this calculation is given at the close of this article, which may be followed with perfect confidence, even if the user does not understand the principles upon which it is based, but as many will be interested in a full understanding of the method, it will be described with as much clearness and simplicity as the ability of the author can command, and the nature of the subject permits.

The method of exactly balancing rations by direct calculation depends on the principles of alligation, a somewhat neglected chapter in arithmetic, and perhaps the solution of a simple problem in alligation will suitably introduce the more complex problem of calculating rations. Suppose that a grocer has two grades of tea worth 20 cents and 50 cents per pound respectively, and wishes to make a mixture of them which shall be worth 30 cents per pound, what amounts must he take of each? It will be seen that for each pound of the fifty-cent tea that he uses he will lose 20 cents, and that on each pound of the twenty-cent tea he will gain 10 cents. He must therefore put in two pounds of the twenty-cent tea for each pound of the fifty-cent tea. To put the matter another way, the total amount that the grocer gains on the one tea must be exactly equal to the total amount that he loses on the other, and consequently the quantities of each required will be inversely proportional to the amount gained or lost on one

pound in each case. Hence the amount required of the first, is to the amount required of the second, as the gain (or loss) on each pound of the second is to the loss (or gain) on each pound of the first. On each pound of the first tea used the grocer gains 10 cents; on each pound of the second he loses 20 cents; hence the quantity to be used of the first, is to the quantity to be used of the second as 20 is to 10 or as 2 is to 1. The following calculation shows the correctness of these proportions:

	2	pounds at 20 cents are worth....	40 cents
	1	pound at 50 cents is worth......	50 cents
Adding:	3	pounds of the mixture are worth	90 cents, or 30 cents per pound.

The analysis of this problem is so simple that one can solve it almost by inspection. If the values were in less simple ratios the case would be more difficult, and the arithmetics give a somewhat mechanical method of solving problems in alligation something as follows: Arrange the several values, including the mean to be produced, in the order of their magnitude, or at least bringing all values below the mean in one group and all values above the mean in another. Then pair off these values so that each one is balanced against one in the other group. In case the values are not equal in number in the two groups, it will be necessary to balance one or more in one of the groups against more than one in the other group. Consider then one pair at a time. Find the difference between each value and the desired mean value, and set this opposite the *other* value. Each difference will represent the amount to be taken of the article of the value opposite which the difference is set. Of course, other amounts which are in the same ratio may be taken instead of the quantities represented by the differences. Proceed in this way with all the pairs. If a value is paired with more than one in the other group, the differences set opposite this value are added together to get the total amount to be taken of the article having that value. It must not be forgotten, however, that this quantity is a sum, and if any variation in its amount is desired all of the items paired with it in the other group must be varied in the same proportion. If this is not desirable each pair may be separately multiplied or divided in any way that one wishes, before adding the several amounts set opposite the values.

Applying these directions to the problem previously solved, we arrange the values and differences as follows, the mean being in boldface type:

Cents.	Difference.
50	10 = pounds to be taken at 50 cents.
30	
20	20 = pounds to be taken at 20 cents.

Proof:	10 lbs. at 50 cents are worth	$5.00
	20 lbs. at 20 cents are worth	4.00
	30 lbs. at 30 cents are worth	$9.00

It is evident, also, that any other quantities may be taken that are in the ratio of 10 to 20, for example 5 to 10, 2 to 4, or 15 to 30.

Let us take another example: Suppose the grocer wishes to mix five kinds of tea worth 20, 25, 30, 35, and 40 cents, so as to obtain a mixture worth 28 cents. Separating these into two groups as explained above we have 20 and 25 in the group having values less than the mean to be obtained, and 30, 35 and 40 having values greater than the mean. We may pair them and take the differences as follows:

Cents.	Difference.	
30	8 = pounds to be taken at 30 cents, value...	$2.40
28		
20	2 = pounds to be taken at 20 cents, value...	.40
	10 = pounds at 28 cents give a total value of	$2.80
35	3 = pounds to be taken at 35 cents, value...	$1.05
28		
25	7 = pounds to be taken at 25 cents, value...	1.75
	10 = pounds at 28 cents give a total value of	$2.80
40	3 = pounds to be taken at 40 cents, value...	$1.20
28		
25	12 = pounds to be taken at 25 cents, value...	3.00
	15 = pounds at 28 cents give a total of.......	$4.20

It will be seen that each pair produces a mixture of the required composition. These pairs may therefore be taken in any quantities desired, only being certain that if the quantity of one member of a pair is altered the quantity of the other member is altered in the same ratio.

Adding together the above quantities and amounts we have the following:

Pair 1	8 lbs. 30-cent tea are worth	$2.40
	2 lbs. 20-cent tea are worth	.40
Pair 2	3 lbs. 35-cent tea are worth	1.05
	7 lbs. 25-cent tea are worth	1.75
Pair 3	3 lbs. 40-cent tea are worth	1.20
	12 lbs. 25-cent tea are worth	3.00
Totals:	35 lbs. 28-cent tea are worth	$9.80

It will be noticed that the 25-cent tea is used in both the second and third pairs, so that the total amount of that to be used is 19 pounds. Suppose now that the grocer has a large quantity of the 35-cent tea which he wishes to use. Since each pair is exactly balanced within itself, he may use 30 lbs. of the 35-cent tea but must offset that by 70 lbs. of the 25-cent tea as shown in pair (2); that is, if he takes 10 times as much of the 35-cent tea he must take 10 times as much of the 25-cent tea as was required to balance it, not 10 times 19, that is the total amount of the 25-cent tea, since 12 lbs. of the 19 lbs. went to balance the 40-cent tea. The values could have been paired in any other way, provided only that one less than the mean is always paired with one greater than the mean. This, with the fact mentioned that the quantities obtained in any pair may be multiplied or divided at will, enables him to adapt his mixture to the amounts of the several grades that he has.

The problem of the tea has been treated thus minutely since the principles involved in its solution are used in the balancing of rations. The latter case involves another complication or two, however, which will be treated at the proper place.

In balancing rations, the problem primarily is not one of balancing values, which could be done in the manner indicated above, but in balancing the energy obtainable from nitrogenous organic constituents of feeds against that obtainable from non-nitrogenous organic constituents; the protein against the fats and carbohydrates. The ratio of the energy that can be obtained from the protein, to the energy that can be obtained from the fats plus the carbohydrates is called the nutritive ratio. In calculating this ratio, since fats give about 2¼ times as much energy as protein or carbohydrates, we multiply the amount of the fats by 2¼ to reduce them to an equivalent amount of protein or carbohydrates.

In the discussion which follows, since the energy yielded by a food principle is directly proportional to its weight, weights will be considered rather than energy values, and to simplify expression, *protein* will mean the nitrogenous substances of the feeds, and *non-protein* will mean fats multiplied by 2¼, plus carbohydrates.

When we speak of a feed having a nutritive ratio of 1 to 5, then, we mean that in a quantity sufficient to contain 1 pound of protein, the weight of the carbohydrates plus 2¼ times the weight of the

fats will be 5 pounds, or to use the simplified form of expression, the protein is to the non-protein as 1 is to 5.

In applying the principles of alligation to the calculation of the quantities of each of two feeds with different nutritive ratios, that must be taken to produce a mixture that will have a definite nutritive ratio of any intermediate value, we must deal *not with equal weights as units, but with weights of each that contain equal weights of protein.* Figures proportional to these weights are obtained by dividing 100 by the percentage of protein contained in the feeds respectively. Thus, if a feed contains 5 per cent of protein 100 pounds of it will contain 5 pounds, and 100 divided by 5, that is 20, is the number of pounds that will contain 1 pound of protein. Similarly if a feed contains 12.5 per cent of protein, 100 divided by 12.5, that is 8, will be the number of pounds of the feed that will contain 1 pound of protein. I propose to call the quotient obtained by dividing 100 by the per cent of protein, the *protein-equating factor.* Let us proceed then, remembering that our units are to contain equal weights of protein, that is, they will contain as many units of weight, say pounds for instance, as are expressed by the protein-equating factors.

To simplify calculations let us assume that we have two feeds, *a* and *b*, containing the following percentages of digestible constituents:

	Protein.	Carbohydrates.	Fat.
a.	5.0	65.5	2.0
b.	12.5	68.25	3.0

The nutritive ratio of *a* is calculated as follows: Multiply the fat by 2¼, and add it to the carbohydrates to get the non protein term. 2¼ times 2 gives 4.5. This added to 65.5 gives 70. The protein is to the non-protein as 5 is to 70, therefore. Dividing both terms of the ratio by 5 to make the protein unity, we get the ratio, 1:14, as the nutritive ratio of feed *a*. Proceeding in the same way with feed *b*, 3 x 2¼ gives 6.75, which added to 68.25 gives 75. The nutritive ratio then is 12.5 to 75, or 1 : 6.

The protein-equating factors of each are found by dividing 100 by the respective percentages of protein. 100 divided by 5 gives 20 as the protein-equating factor of *a*, and 100 divided by 12.5 gives 8 as the protein-equating factor for *b*. Collecting all these data in one view, we have:

	Protein.	Carbo-hydrates.	Fat.	Nutritive ratio.	Protein-equating factor.
a.	5.0	65.5	2.0	1:14	20
b.	12.5	68.25	3.0	1:6	8

Let it be required to make from these two feeds a mixture the nutritive ratio of which is 1:9. Regarding this as a problem in alligation, in reference to the second terms of the ratios, we have:

		Second term of ratio.	Difference.
	a	14	3
Mixture		9	
	b	6	5

The numbers 3 and 5 obtained, give with *a* and *b*, respectively, the number of times that a weight of the feed containing 1 pound of protein must be taken. In other words, those figures multiplied by the protein-equating factors will give the number of pounds of each that must be taken to produce the required mixture.

Let us see that this is true. The protein-equating factor for *a* is 20, which multiplied by 3 gives 60 as the number of pounds of *a* required. The protein-equating factor of *b* is 8, which multiplied by 5 gives 40, the number of pounds of *b* that are required. Calculating from the percentage composition the weights of each food principle contained in these weights of the two feeds, we have the following:

	Protein.	Carbohydrates.	Fat.
a	.05	.655	.02
	60	60	60
Pounds:	3.00	39.300	1.20 X 2¼ = 2.70.
b	.125	.6825	.03
	40	40	40
Pounds:	5.000	27.3000	1.20 X 2¼ = 2.70.

Collecting quantities, we have:

		39.3	
		27.3	
3		2.7	
5		2.7	
8	lbs. protein.	72.0	lbs. non-protein.

Hence the nutritive ratio is 8 : 72, or 1 : 9.

Let us now apply the method to the balancing of a ration consisting of corn and alfalfa. The percentages of digestible nutrients, nutritive ratios and protein-equating factors are shown in the following table:

	Protein.	Carbohydrates.	Fat.	Nutritive ratio	Protein-equating factor.
Corn,	7.14	66.12	4.97	1:10.826	14.0
Alfalfa,	10.58	37.33	1.38	1: 3.82	9.45

The nutritive ratio of corn given above is calculated as follows:

$$\frac{7.14:(4.97\times 2\frac{1}{4})+66.12}{7.14}=1:10.826.$$

The protein equating factor for corn is: $100 \div 7.14 = 14.0$.

The nutritive ratio of alfalfa is: $\dfrac{10.58 : (1.38 \times 2\frac{1}{4}) + 37.33}{10.58} = 1:3.82$.

The protein-equating factor for alfalfa is: $100 \div 10.58 = 9.45$.

Let it be required to calculate what amounts of alfalfa and corn of the above composition must be mixed to produce a balanced ration for fattening cattle in the first period, the nutritive ratio to be 1:6.5, according to the Wolff-Lehmann standard.

Applying the methods of calculation described, we have:

	Second term of ratio.	Difference.		Protein-equating factor.		Relative quantities.
Corn,	10.826	2.68	X	14.0	=	37.52
Proposed,	**6.50**					
Alfalfa,	3.82	4.326	X	9.45	=	40.88

That is, 37.52 pounds of corn with 40.88 pounds of alfalfa of the composition specified will produce a mixture having the nutritive ratio 1:6.5.

Proof:

37.52 X .0714 = 2.680 = lbs. protein in 37.52 lbs. corn.
40.88 X .1058 = 4.325 = lbs. protein in 40.88 lbs. alfalfa.
7.005 = lbs. protein in 78.40 lbs. corn and alfalfa.

37.52 X .6612 = 24.81 = lbs. carbohydrates in 37.52 lbs. corn.
40.88 X .3733 = 15.26 = lbs. carbohydrates in 40.88 lbs. alfalfa.
40.07 = lbs. carbohydrates in 78.40 lbs. corn and alfalfa.

37.52 X .0497 = 1.865 = lbs. fat in 37.52 lbs. corn.
40.88 X .0138 = .0564 = lbs. fat in 40.88 lbs. alfalfa.
2.429 = lbs. fat in 78.40 lbs. corn and alfalfa.

Calculating the nutritive ratio: $\dfrac{7.005 : 40.07 + (2.429 \times 2\frac{1}{4})}{7.005} =$ 1:6.5, which is the proposed nutritive ratio.

Let us now calculate the proportion in which corn stover and alfalfa must be taken to produce a mixture in which the nutritive ratio is 1 : 6.5. The following table shows the composition, the nutritive ratios and the protein-equating factors of these feeds:

	Protein.	Carbohydrates.	Fat.	Nutritive ratio.	Protein-equating factor.
Corn Stover,	1.98	33.16	0.57	1 : 17.39	50.51
Alfalfa,	10.58	37.33	1.38	1 : 3.82	9.45

	Second term of ratio.	Difference.		Protein-equating factor.		Pounds required.
Corn Stover,	17.39	2.68	X	50.51	=	135.36
Proposed,	**6.50**					
Alfalfa,	3.82	10.89	X	9.45	=	102.91

That these quantities are correct has been proved by making the necessary calculations in the same manner as with the ration of corn and alfalfa.

We now have two mixtures which possess the same nutritive ratio; let us call the first one A, and the second one B. The following table shows certain data concerning them:

	Total lbs.	Protein, lbs.	Carbohydrates, lbs.	Fat, lbs.	Nutritive ratio.	Ratio of fat to carbohydrates.
A:						
Corn,	37.52	2.68	24.81	1.86	1 : 10.826	
Alfalfa,	40.88	4.32	15.26	0.56	1 : 3.82	
Mixture,	78.40	7.00	40.07	2.42	1 : 6.5	1 : 16.55
B:						
Corn stover,	135.36	2.68	44.88	0.77	1 : 17.39	
Alfalfa,	102.91	10.89	38.42	1.42	1 : 3.82	
Mixture,	238.27	13.57	83.30	2.19	1 : 6.5	1 : 38.03

We have, then, in A and B two mixtures with the same nutritive ratio, and may therefore combine these mixtures in any proportion, and the nutritive ratio of the compound mixture will be the same, viz., 1:6.5. Now if we compare A and B in respect to relative amounts of fat and carbohydrates, the two groups of substances composing the non-protein, we see that they differ materially. In A the fats are to the carbohydrates as 1 : 16.55, while in B the ratio is 1 : 38. According to the Wolff-Lehmann standards the ratio of fats to carbohydrates in a ration for fattening cattle during the first period should be 1 : 30. It may well be doubted whether it is necessary or even best to reduce the fat to so low a proportion, but, be that as it may, our method enables us to calculate the exact amounts that must be taken of each of two feeds or mixtures possessing the same nutritive ratio, but one having too much fat and the other too little. We proceed exactly as in balancing the ration as to protein and non-protein, except that we must calculate a fat equating factor for each feed or mixture to be used. This factor represents the *number of pounds that must be taken to get a pound of fat* in the several cases, and is obtained by dividing the total weight by the amount of fat. Thus, in A we have, in a total of 78.40 pounds, 2.42 pounds of fat. 78.40 divided by 2.42 gives 32.4, which is the number of pounds of that mixture necessary to use in order to get one pound of fat, and is the fat-equating factor of A. In B, in a total of 238.27 pounds, we have 2.19 pounds of fat. 238.27 divided by 2.19 gives 108.8 which is the number of pounds of B that contains one pound of fat, and is the fat-equating factor for B.

Proceeding by alligation as before, we get the following:

	Second term of ratio.	Difference.		Fat-equating factor.		Pounds required.
Mixture B,	38.03	13.45	X	108.8	=	1463.36
Standard,	30.					
Mixture A,	16:55	8.03	X	32.4	=	260.17

From this we see that 260.17 pounds of A will be required for 1463.36 pounds of B.

Proof: In the compound mixture we have 260.17 ÷ 78.4 = 3.318 units of mixture A, and 1463.36 ÷ 238.27 = 6.141 units of mixture B. Calculating the quantities of fats and of carbohydrates which these quantities contain, we have:

3.318 X 2.42 = 8.03 lbs. fat in 260.17 lbs. of mixture A.
6.141 X 2.19 = 13.45 lbs. fat in 1463.36 lbs. of mixture B.

21.48 lbs. fat in compound mixture.

3.318 X 40.07 = 132.95 = lbs. carbohydrates in 260.17 lbs. of mixture A.
6.141 X 83.3 = 511.54 = lbs. carbohydrates in 1463.36 lbs. of mixture B.

644.49 = lbs. carbohydrates in compound mixture.

21.48 is to 644.49, as 1 is to 30, the proposed ratio of fats to carbohydrates.

For use later, we may at this point calculate in a similar manner the total amount of digestible protein in the compound mixture.

3.318 X 7.00 = 23.23 = lbs. of protein in 260.17 lbs. of mixture A.
6.141 X 13.57 = 83.33 = lbs. of protein in 1463.36 lbs. of mixture B.

106.56 = lbs. of protein in the compound mixture.

The quantities of corn, alfalfa and corn stover required to compound a ration in which the nutritive ratio is 1:6 5, and the ratio of fats to carbohydrates is 1 : 30, are found by the following calculations:

37.52, the pounds of corn in A, multiplied by 3.318, the units of A used, gives a product of 124.49, the corn required.

40.88, the pounds of alfalfa in A, multiplied by 3.318, the units of A used, gives 135.64 as the number of pounds of alfalfa required in A for the compound mixture.

135.36, the pounds of corn stover in B, multiplied by 6.141, the number of units of B used, gives 831.25, the amount of corn stover required.

102.91, the pounds of alfalfa in B, multiplied by 6.141, the units of B used, gives 631.97 as the alfalfa in B required for the compound mixture.

Adding together the quantities of alfalfa, we have the following:

Alfalfa, 767.61 lbs.; corn stover, 831.25 lbs.; corn, 124.49 lbs.; total, 1723.35.

These figures represent the proportions in which these three feeds must be mixed to produce a ration with the nutritive ratio 1 : 6.5, and with the fats to the carbohydrates as 1 is to 30. Any change of one only of these quantities will alter these ratios. The component A or B may be altered to any desired extent without altering the nutritive ratio, but the ratio of fats to carbohydrates would be changed. Since fats and carbohydrates can to a considerable extent replace each other in a ration, it seems almost certain that for western practice it would be better to use more of mixture A, and therefore more corn, and less of mixture B, and therefore less corn stover. The nutritive ratio would thus be preserved, but the proportion of fat would be increased. However, the object of this article is not to discuss any particular ration, but to show that a ration can be calculated exactly which will possess a given nutritive ratio, and a given relation between fat and carbohydrates. The preceding calculations demonstrate this, and the principles there illustrated are capable of still greater extension by application of the same general method.

It was shown above that the 1723.35 lbs. contain 106.56 lbs. protein, 644.49 lbs. carbohydrates, and 21.48 lbs. fat, or a total of 772.53 lbs. of these nutrients. In this ration then we may readily calculate the percentage of total digestible nutrients, and it is found to be 44.82. From this the amount to be fed to obtain any desired amount of digestible nutrients is readily computed.

From the principles illustrated in the preceding examples we may derive the following:

Rules for the exact calculation of balanced rations—

1. Unless shown in tables, calculate the *nutritive ratio* of the ration to be compounded, and each of the feeds entering into it. To do this, multiply the percentage of fat by 2¼, add the product to the percentage of carbohydrates, and divide the sum by the percentage of protein. The quotient will be the second term of the ratio, the first being 1, since protein has been made unity by taking it as the divisor.

2. Unless shown in tables, calculate the *protein-equating factor* for each feed by dividing 100 by the percentage of protein contained in the feed. The quotient will show the number of pounds of the feed that must be taken to get 1 pound of protein, and is the protein-equating factor.

3. Compare the second term of the nutritive ratio of the ration to be compounded with that of each feed that is to enter into it by arranging these second terms for the several feeds in two groups, placing all greater than that from the proposed ration in one group, and all less in the other. Pair off the second terms in one group against those in the other. If the items in the two are not equal in number, pair one or more in the group having the smaller number of items against two or more in the other group.

4. Consider now each pair separately. Mark each second term with the name of the feed from which it is derived. Find the difference between each second term and the second term for the proposed ration, and set each difference opposite the name of the *other* feed. Each difference multiplied by the protein-equating factor for the feed opposite the name of which it is set will give the number of units of weight to be used of that feed. Proceed with each pair in the same manner. Each pair will then constitute a ration having the required nutritive ratio. The several pairs may then be mixed in any desired quantities to compound the ration, only remembering that each pair must be taken in its entirety, and the two items in it always taken in the ratio indicated by the units of weight obtained. These units may be multiplied or divided in any way desired, provided that the ratio between them is kept the same. If a feed has been paired with more than one other, the units of weight obtained for that feed in the several pairs must be kept separate until the amounts of each pair to be taken have been determined. Finally, all the quantities for each feed are united, but in this sum a part may balance one feed, another part another.

5. To provide the fat and the carbohydrates in quantities that shall possess a given ratio to each other, and at the same time have a definite nutritive ratio for the ration, it is necessary to have two or more feeds or mixtures of feeds that have the required nutritive ratio, one or more of which has too much fat and one or more too little fat. Calculate a *fat-equating factor* for each of these feeds or mixtures of feeds by dividing the weight of a given amount of the feed by the weight of the fat which that amount contains. The fat-equating factor is thus the number of pounds of feed having the desired nutritive ratio that contains one pound of fat.

6. For the ration to be made, and for each of the feeds or mixtures of feeds that is to enter into it, calculate the ratio of the fat to the carbohydrates. Make the first term of the ratio 1 and let it represent the fat by dividing the quantity of carbohydrates by the quantity of fat. The quotient will be the second term of the ratio. Arrange the second terms in two groups, one of which shall contain all that are greater than that of the proposed ration, and the other all that are less. Pair off the second terms as before, marking each with the name of the feed to which it belongs. Consider each pair separately; find the difference between each second term and that of the proposed ration, and set each difference opposite the name of the other feed or mixture of feeds. Each difference multiplied by the fat-equating factor for the feed opposite the name of which it is set will give the units of weight to be taken of that feed or mixture. Proceed with each pair in the same way. Each pair, taking its components in the proportions indicated by the units of weight, will constitute a ration having the required nutritive ratio, and having the required ratio between the fat and carbohydrates. If more than one pair have been thus balanced, they may be mixed with each other in any proportion desired. It will be seen that by proceeding in a similar manner the ration, if desired, might be balanced in still other respects, for example, in percentage of digestible matter. The process could be continued until it had been applied to all of the imaginable differences, being limited only by the composition of available feeds.

7. The weight of digestible matter in the ration may be calculated by obvious processes, by means of the quantities used, and the percentage of digestible nutrients which they contain.

It is apparent that the labor of calculation may be much abridged by the use of tables which show the nutritive ratios, and the protein-equating factors with the composition of the feeds. It is the purpose of the writer to prepare a bulletin containing such tables, and including fuller illustrations of this method of calculating rations.

J. T. Willard.

Miss Kate Zimmerman, '00, has resigned her position as instructor in sewing at the Presbyterian Mission School, of Concord, N. C., to accept a similar place in Santa Fe, N. M., with an appreciable increase in salary.—*Herald.*

THE INDUSTRIALIST.

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PROF. J. D. WALTERS..........Local Editor
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LOCAL NOTES.

Doctor Mayo was called to Wellington last Friday to investigate a disease of horses.

The alumni and many other important locals were crowded out this week, but will appear in next issue.

In the absence of Prof. G. L. McKay, F. A. Leighton, one of the editors of the Chicago *Dairy Produce*, scored the butter for the Dairy Association.

The senior class in veterinary science witnessed an interesting surgical operation performed by Doctor Mayo, before the class, on Friday of last week.

Prof. H. M. Cottrell went to Kansas City on Monday to examine by-products of the packing-houses, in order to select the most valuable ones for tests in pig-feeding experiments.

C. W. Peckham, of Haven, Reno county, has donated the Farm Department of the College a trio of Mammoth Bronze turkeys, and the Cornell Incubator Company, of Ithaca, N. Y., has donated a Cornell incubator and a Cornell brooder.

March 10 to March 15, Geo. W. Berry, Topeka, Kan., will handle the judging school, teaching judging swine. Mr. Berry is one of the greatest expert judges of swine in the United States, and is a fine teacher. Everybody interested in this line of work is invited to come.

Geo. A. Dean, '95, has been elected assistant in entomology to succeed J. B. Norton, whose resignation was noticed last week. Mr. Dean has been doing graduate work in the department for the last nine months, and will doubtless do himself credit in his position.

All the meetings of the Dairy Association were well attended. The sessions were held in the chapel and every one could boast of a full house of students as well as patrons. Secretary Borman, of the Association, says that the attendance from outside ran very close to three hundred.

The stereopticon lecture by Major Henry E. Alvord, of Washington, D. C., before the Dairy Association on Wednesday evening was so interesting and instructive that the students asked him to give another lecture on Saturday evening. He kindly consented to speak on his "trip through Europe and his visits to their agricultural schools," and was again greeted by a full and appreciative house. The Major certainly knows how to hold and interest an audience.

J. G. Haney, '99, was appointed superintendent of the Fort Hays Branch Experiment Station at the meeting of the Board of Regents last week. Mr. Haney's experience in western farming and as assistant in field and feeding experiments here gives assurance of effective service in this important position.

Score two for the Kansas State Agricultural College boys! In cheese making, J. M. McFerren, of Williamsburg, took first prize at the Dairy Association contest, with a score of 95; W. L. Souders took second prize, score 94.5. Both Mr. McFerren and Mr. Souders are graduates of the Dairy Department.

The *Daily Industrialist* published during the session of the Dairy Association was as neat as a rosebud and as juicy as a peach. The Dairy Department and the print-shop may well feel proud of it. Some day, less than a hundred years hence, the Agricultural College will publish a daily the year round.

Louis P. Brous, M. S., formerly assistant in the Department of Industrial Art and at present architect and building superintendent of the well-known firm of meat packers, Schwarzschild & Sulzberger, of Kansas City, returned from Chihuahua, Mexico, where he has been for the past two years erecting a packing establishment for the firm. He expects to visit several places before going back to Mexico. Last week he presented the College library with a dozen large photographs of ancient art objects in the Mexican national museum. The plates were made by himself and will be very interesting to students of Atztec civilization.

The College family has been again broken in upon by the death of Miss Olive Long, '98, in Denver, March 4, 1902. Miss Long has been in ill health since the death of her sister Clare, and went to Denver in 1899 in the hope of being permanently benefited. She improved for some time, but consumption had too strong a hold. Her funeral was held at Manhattan, Thursday, March 6. Miss Long was a clerk in the Secretary's office at the College at the time of her departure for Colorado. She was faithful and efficient in the performance of her duties. She will be much missed by her many friends, as well as by her immediate family, who have the sympathy of all.

The *Daily Drovers Telegram*, published in Kansas City, speaks of the work of Mr. John Gosling during the beef-judging week at this College in most enthusiastic terms. After describing his methods and the program of his work, it says: "Mr. Gosling has the rare combination of thoroughly knowing his subject and of knowing how to tell others. He is a wonderful teacher. He talks three hours and a half each afternoon and then the students eagerly crowd around him and ask for more." We can only say that the *Telegram* is right. He captured the students from the start by his positive statement that there is no such thing as a dual-purpose cow, and that beef and milk are not found in the same carcass.

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W. D. Cramer, Ph. B. (Mich. Teachers' Coll.) Assistant in Zoölogy .... ———
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Matilda Doll, Stenographer .... ———
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THE INDUSTRIALIST.

VOL. 28. MANHATTAN, KAN., MARCH 18, 1902. NO. 22

WHAT DO YOU READ?

ARE we getting to be a people of sentiment? Are we, in fact, becoming a sentimental people? These questions arise naturally in the mind after looking over the lists of new books issued each month of the year and noting the fact that throughout all of them runs a thread of love story. This love story is either the absorbing theme of the book or merely a slender chain upon which to hang an exposition of one of the many "isms" of the day. The historical novel, now so popular, is made palatable by a spice of romance; the school of the realistic sugar-coats its most "realistic" theories with a veneer of sentiment; the religious novel sprinkles its theology generously with emotions of the heart; reform movements appeal to our sympathy by the woes of some hapless pair, or pairs, of lovers, through whose unhappiness we are made to see the need of certain reforms; morbid minds give to the world their gloom through the medium of an affair of the heart.

Science alone seems slow to avail itself of this method of securing readers, though certainly courtship by getting "close to the great heart of nature" is not very unusual in the domain of fiction or in real life. And why should not the wireless telegraph and the new airship furnish excellent mediums for the telling of the "old, old story?"

This is preëminently the age of the novel, and it remains to be seen whether or not the universal reading of romance will have a good or bad effect upon the lives and minds of the people who read them. Stories for children have multiplied till we scarcely know where to choose among the long list of juvenile "classics," but the tendency of too many of these stories is toward a weak supersentimentality which aims to teach the child to aspire to higher deals by appealing to the softer elements in his nature. This would be good if with it he could acquire the strength and virility necessary to truly ideal types, but sentimentality has never pro-

duced strength, and to make vigorous, healthy manhood and womanhood we need vigorous, healthy brain food.

The reading of a strong dramatic story certainly produces an effect on the mind that is vivid if not lasting. Who has not felt the depressing influence of the morbid realistic story and the generous uplifting emotions of the mind produced by a good, healthy novel?

Since it is true that these stories we read have some influence on our minds, we cannot but consider their ultimate effect on this novel-reading generation. The realist says the writer should picture life as it is, and for him "life as it is" is always the sordid, unhappy and even sinful elements which exist everywhere. But is that side of life really the only true one? Is there not healthy, happy thought and emotion everywhere in the world? Why look at the dark, the ugly, the weak side of life merely, when there is a bright, sunshiny side to be seen by those who wish to do so? Pessimism, one of the worst crimes against society, is fostered by the morbid, unhealthy tone of many of these novels.

Charles Dickens wrought needed reforms by showing pictures of the shady side of life, yet he is always cheerful and wholesome. Thackeray scored social evils, but with a cheery voice. Among the novels of to-day we find scores of healthy stories which teach the true doctrine of cheerfulness in a most satisfying style.

It has been said that to read anything is better than to read nothing, and surely the spread of the reading habit, even though abnormally developed in the direction of romances, is a good thing. One can not go far astray if he be guided by a healthy, active mind, for on every hand are stories of real value and these can do no harm, if the mind at the same time is given other material with which to develop its strength. The chief point of danger lies in the fact that many will read the romances to the exclusion of all other kinds of reading. MARIAN E. JONES.

The new Physical-Science building has progressed rapidly during the past two weeks. The walls of the building proper are completed and the tower will be ready for the roof in a few days. The plasterers have commenced the work of lathing and the tinners are expected to be here in full force from Topeka during the present week to begin the roof work.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

FROM Washington, D. C., comes the hopeful news that the metric system of weights and measures will come up before Congress for discussion and adoption, and those who have studied the manifold advantages of that system over our chaos of incongruencies are once more expecting the final triumph of commonsense and the meter. The bill to adopt the different units of the metric system as the standard for the United States, as introduced by Representative Shafroth, of Colorado, has been ordered favorably reported by the house committee on coinage, weights and measures. It provides: "That after January 1, 1904, all departments of the government of the United States, in the transaction of all business requiring the use of weight and measurement, except in completing the survey of public lands, shall use only the weights and measures of the metric system, and after the first of January, 1905, the weights and measures of the metric system shall be the legal standard weights and measures of and in the United States."

The meter is truly the international measure to-day. It has been adopted by all the countries of Europe from Spain to Russia and from Greece and Turkey to Denmark and Sweden, slow, old England being the only exception. It is the only measure in use in Mexico, the central American republics, Bolivia, Peru, Brazil, Chili, Uruguay, Paraguay, and Argentina—that is, the only measure used south of the Rio Grande. It has been adopted by Egypt and Morocco, by Arabia, Persia and Japan; it is rapidly becoming the measure for China, and slow, old England has decreed it the measure for India. The Cape of Good Hope countries and the Australian provinces are using it, and we—we have been waiting for England and Canada to do something.

Bills adopting the international system of measurements have at various times been introduced in Congress and have always found favorable consideration. Several times such bills have passed one or the other house, and at two different times, in fact, both houses, only to be recalled before the president's signature could be affixed. The friends of progress should lend a hand this time so that the measure will not miscarry once more.

The advantages of the decimal system of measures over the abracadabra which we are now using are too obvious to need discussion at the present time. This subject has been discussed for

over fifty years in all countries of the world; books have been written in all languages showing its enormous advantages as compared with its few imaginary disadvantages, and our American text-books on arithmetic, mechanics, chemistry, etc., have for years endeavored to acquaint the pupils of the educational institutions with the simple rules of the system. It is the opinion of those who have watched its introduction into other countries that three weeks of use of the meter would complete its adoption in nearly every branch of commerce or manufacturing. The advantages of a decimal system over a haphazard system are simply the advantages of a dollar divided into 10 dimes and 100 cents over a dollar divided into 16½ dimes and 113 cents, or of a pound divided into 10 ounces and 100 grains over one divided into any other kind of subdivisions. They are still greater than the above examples can illustrate because of the well-established relations of the metric weights with the metric measures and the specific gravity tables. There are no such simple and natural relations existing in our systemless systems to-day.

Years ago John Quincy Adams said that the introduction of the metric system would do more for America than the introduction of steam had done. Other public men have made similar statements. Let us have the meter!

J. D. WALTERS.

NOTICE TO ALUMNI.

MANHATTAN, KAN., March 17, 1902.

To the Alumni of the Kansas State Agricultural College, Greeting:

The officers of this association wish thus early to address you with an advance notice of our program for 1902:

Wednesday afternoon, June 18, annual business meeting.
Wednesday evening, June 18, alumni address, Mrs. Nellie Kedzie-Jones.
Thursday evening, June 19, triennial reunion and banquet.

The question of the adoption of a new constitution, which was quite fully discussed about a year ago in the columns of the INDUSTRIALIST, is the principal unfinished business to come before the association on Wednesday afternoon. This proposed constitution embodies several changes, not only in the relation of the alumni to the association and to the College, but in methods of conducting the business. It is therefore desirable that a large representation of the members of the Alumni Association be present at this meeting.

We are particularly fortunate in being able to promise you the pleasure of listening to an address on Wednesday evening delivered by Mrs. Nellie Kedzie-Jones.

Extensive preparations are already being made for the evening of the banquet. There will not only be a feast of good things to eat, but appropriate exercises of a musical, literary and social character, which will not be a disappointment, we assure you.

Your officers beg thus early to solicit the cordial support and good will of every alumnus, trusting that you will prearrange for and make certain your attendance upon these and in fact all of the Commencement exercises Our plans embrace a wide representation of the alumni at the banquet—our purpose being to secure the best and most representative speakers available. We desire and expect to make this the largest, best and happiest gathering in the history of our Alma Mater.

It is not too early for you to lend us cordial, hearty support by planning to attend the coming reunion and using your influence to induce others resident in your vicinity to attend.

We will address you later through the medium of the INDUSTRIALIST, giving details as they are finally arranged. And still later we expect to hear from you personally as to the probability of your attendance upon what we hope to make our most successful reunion. Faithfully yours,

H. C. RUSHMORE, *Pres.*
MAYME HOUGHTON-BROCK, *Vice-Pres.*
C. JEANETTE PERRY, *Sec'y.*
ALBERT DICKENS, *Treas.*

PNEUMONIA IN CATTLE.

(Press Bulletin No. 112, issued by Veterinary Department.)

At various times in the past there has appeared in the West, especially during the winter season, a form of bronchial pneumonia attacking cattle sometimes in such numbers as to appear to be contagious. These outbreaks have usually occurred during the winter which succeeds an unusually dry season, when the water supply for stock purposes is greatly reduced and the rough forage used for feeding cattle is of poor quality. During the past fall and winter numerous reports of a disease among cows and heifers have been received from various and widely separated places in the central and eastern parts of this State. In most cases several animals were reported sick with the same general symptoms. which caused the owner or neighbors some alarm lest it might be a serious, contagious disease. Owing to the similarity of symptoms, some stockmen have surmised that their cattle were suffering from bovine tuberculosis in an acute form. An investigation of the disease shows it to be a broncho-pneumonia or an inflammation of the bronchial tubes which carry the air into the lungs, together

with the adjoining lung tissue. The disease is of a comparatively mild type, and so far as has been observed has only attacked cows and heifers. Most of the animals examined have been in fair to good flesh.

Causes.—The disease is probably caused by a poor quality of coarse food, especially corn-fodder. The dust or other irritating material in the fodder seems to irritate the bronchial tubes; this irritation enables certain bacteria that live in the air passages normally, to multiply rapidly and cause an inflammation of the tissues. The disease is not contagious but several animals may contract it from the same source; that is, infected food.

Symptoms.—The animal is noticed coughing, especially when first turned out or exercised after lying down. The cough is painful; at first, dry, and as the disease progresses becoming more moist, the animal often coughing up considerable mucus. The breathing is rapid and labored; exercise causes the animal to pant, cough, and often stand with the mouth open and the tongue protruding in order to breathe. There is a tendency for affected animals to lie down, and in severe cases the nose is extended in front, the lower jaw resting on the ground. In mild cases the appetite may be fairly good, but in severe cases the animal eats but little and this, with the distressing cough, causes a rapid falling away in flesh. The bowels are usually constipated. A majority of affected animals will recover, with good care.

***Post Mortem* Appearances.**—The lungs, when examined after death, do not appear severely inflamed. They are of a grayish color and instead of being soft and elastic to the touch are quite firm and hard, and do not collapse, as is usual when the chest is opened. The smaller bronchial tubes are filled with mucus; the large bronchi and the trachea (windpipe) are slightly inflamed and contain much mucus.

Treatment.—Medicinal treatment is of little value; in fact, the excitement attending drenching the animal and the possibility of getting medicine into the lungs is apt to do more harm than good. The animal should receive the best of care; protection from the weather; laxative, nutritious, but not bulky food; and pure water. Corn-stalks should not be fed; alfalfa, millet or other hay should be sprinkled to lay the dust. Salting the animal, with a mixture of 1 pound of sulphur, 1 pound of air-slaked lime, 1 pound of hyposulphite of soda, all thoroughly pulverized and mixed with ten pounds of common salt is good; a tablespoonful may be given once daily, the animal being allowed to lick it. Bran mashes, to which is added some cotton-seed or oil meal, are excellent. With the advent of warm weather and grass the disease will probably disappear. N. S. MAYO.

Assistant Shoesmith made a test last week of the new Hancock disc plow recently purchased by the Farm Department. The disc plow cut furrows twenty-three inches wide and six inches deep and showed a draft of six hundred sixty-two pounds. It is drawn by three light horses. A walking plow drawn by two horses cut a thirteen-inch furrow six inches deep with a draft of four hundred thirty seven pounds. This shows a draft of twenty-eight and eight tenths pounds per inch of furrow for the disc plow and thirty three and six-tenths pounds per inch of furrow for the ordinary plow.

THE INDUSTRIALIST.

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Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

The bluegrass on the campus is turning green again.

Dr. and Mrs. Weida visited friends in Abilene, Sunday and Monday, March 16 and 17.

Doctor Orr made a number of very fine photographs of the dairy class one day last week.

The winter term will close on Friday, March 28, and the spring term will begin on Tuesday, April 1.

J. R. Young, of Manhattan, has donated to the Farm Department a ten-dollar Barred Rock cockerel.

Mr. D. Trott, of Abilene, Kan., lectured before the class in stock judging, on the Duroc-Jersey hog.

Doctor Mayo left Monday for Ft. Worth, Tex., to attend a meeting of the Cattle Growers' Association.

Professor McKeever will deliver an address before the Riley County Teachers' Association, at Riley, next Saturday, March 22.

Miss Lottie Olin, daughter of Prof. O. E. Olin, won the first prize, $40, of the Ashton sophomore prizes for declamations, at Akron College.

J. W. Mills, short course student last year, has gone to Beaver, Miner county, South Dakota, to work for the Beaver Creamery Company for a year.

The window cord for the new Physical-Science building has arrived. It is a bulky lot of braided linen weighing over two hundred fifty pounds.

Professor Brown has had charge of the sale of tickets for reserved seats for the grand Paderewski concert in Convention Hall, Kansas City, March 17.

Herman Arndt, the well-known Poland-China breeder of Templin, Wabaunsee county, visited the stock judging classes on Wednesday and donated to the College the best Poland-China pig that was ever on the College farm.

The Manhattan Horticultural Society will meet at the College Horticultural Hall on Thursday afternoon, March 20. The program will consist of papers by A. F. Waugh, W. Marlatt, and some members of the Domestic Science class.

The parade reviews of the cadet battalion are becoming popular with the early morning promenaders of the vicinity. Large numbers of visitors are present every day.

Professor Willard is the happy recipient of a fine new office desk—a veritable magazine of a desk containing an almost bewildering labyrinth of handy additions and modern improvements. He also enjoys a battery of new sectional book-shelves.

The Kansas City *Journal* contains an extensive report of the poultry institute held at the College week before last. The article is illustrated by half-tone portraits of Professors Cottrell and Otis, and several large plates showing the students at work in scoring barred Plymouth Rocks.

Mr. Guy H. Miller, in an address before the Dairymen's Association of Southern California, has the following to say about the best cow in the College dairy herd: "This cow, No. 20 of this herd, that made 447.6 pounds of butter [in twelve months] is the best common cow of which I have ever heard."

Prof. G. L. McKay, of the Iowa Agricultural college, who is considered an expert in matters pertaining to cheese, pronounced the cheese made by the College class in cheese making as of very fine quality, considering that the facilities for curing are inadequate and almost unfit for the purpose.

The Experiment Station has just received, through the kindness of Prof. A. S. Hitchcock, from the bureau of plant industry, a large number of varieties of grass seeds for trial on the Station grounds. Several of these are native grasses which it seems likely may prove adapted to artificial planting and propagation.

Major Henry Alvord, chief of the dairy division of the U. S. agricultural department, bought all the butter on exhibition at the association two weeks ago and shipped it to Chicago, where it will be placed in cold storage and scored every two weeks by Government Inspector W. D. Collyer, to test its keeping qualities.

The past week Geo. W. Berry, North Topeka, Kan., gave instructions in swine judging to three hundred forty-five students. Mr. Berry has had a long and unusually successful experience as a breeder of prize winning hogs, and his instruction has been of great value to our students. Thursday Mr. Berry lectured three hours to the short-course classes in feeding and Friday he gave lectures to the dairy-school boys.

The Experiment Station has rented the G. E. Spohr orchard, on Moelman's bottom, about three miles south of the College, for the purpose of testing commercial operations in orcharding. The orchard comprises about forty acres of bearing fruit-trees and is one of the finest in the vicinity of Manhattan. Mr. Spohr intends to make a prolonged trip through central Europe next year, on account of which the College was able to rent the place at very satisfactory figures.

Among the many visitors at the Dairy Association we noticed the jovial countenance of I. D. Graham, ex-Secretary of this College. Mr. Graham is at present connected with the editorial staff of the *Kansas Farmer*. It looked natural to see him strolling through the offices and halls of Main building, shaking hands and telling yarns.

The juniors defeated the Faculty in a hard-fought game of basket-ball last Friday afternoon. The Faculty team had practiced very little but played a great game. The class teams have got something to do when the Faculty gets their team in a little better shape. The score of Friday's game was: Juniors, 7; Faculty, 5. —*Students' Herald*.

Mr. O. Douglass, of Boston, Mass., who has a national reputation as a butter judge, has the following to say in reference to three tubs of butter he received from the Kansas State Agricultural College: "We enclose score on three tubs of butter, marked February 18, 19, and 20, and we find them the finest we have received from any college this winter."

The Board of Regents at their March meeting accepted the general plans and specifications for the new wing of Library Hall, prepared by Prof. J. D. Walters, and instructed the President to advertise for bids for contracts as soon as the necessary detail drawings can be made. The main contract will probably be let on April 15. The total of the legislative appropriation for this purpose is $10,000.

The Printing Department last week received a new No. 5 Underwood typewriter, purchased through the Wagner Typewriter Company, No. 13 West Ninth street, Kansas City, Mo. After considerable inquiry and testing of the different typewriters, Superintendent Rickman decided in favor of the Underwood as the best all-around machine. The operator being able to see the work, or, in other words, it being a "visible" machine, is one of its many favorable characteristics.

The butter output for the month of February, of the College creamery, was about five thousand pounds. Cream was received from the following stations of the Continental Creamery Company: Wakefield, White City, White House, Idana, Latimer, and Clay Center. The creamery received directly from patrons who live in the vicinity of Manhattan one thousand eight hundred eighty-seven pounds of butter fat, for which was paid, at the rate of twenty-three cents per pound, the total sum of $434.12.

The Music Department, who furnished the musical part of the program of the State Dairy Association, has received the following complimentary letter from the music committee: "Dear Professor Brown: Will you kindly tender the thanks of the music committee of the State Dairy Association to all who so kindly and ably assisted in furnishing the music for the convention last week? The selections were excellent and very appropriate. We are sure they were highly appreciated by all who heard them."

The Kansas State Agricultural College will hold a school in judging horses from March 12 to 22. J. W. Robinson, Eldorado, the largest breeder of draft horses in the State, will act as instructor. Mr. Robinson is also an extensive breeder of trotting horses and will give instructions in judging draft, driving, and saddle horses. Some of the best horses in the State have been loaned to the College for this work. All instruction is free. Every man and woman who loves a horse is invited to attend this school. Owners of good horses are invited to bring them and have them judged. The work of the week will be divided as follows: Monday and Tuesday, draft mares; Wednesday, draft teams; Thursday, draft stallions; Friday, trotters and saddle horses; Saturday, all classes. Friday afternoon, at 1 P. M., there will be a parade of forty or more good horses, and in the evening a program will be a given in College chapel on horse breeding.

The Nordica concert is a thing of the past and the Manhattanists who went there, about a hundred strong, are full of praises for the sweet singer. Some of the comments are decidedly unique, but one of the best things we have heard is the letter which H. C. Rushmore, the president of the College Alumni Association, wrote to the editor of the *Daily Capital*. It is as follows: "Do you know whether or not Nordica can sing in just plain, ordinary United States? If she can, will it not be possible, really possible, that the thousands who hear her shall be permitted to listen to her in language which ninety eight out of every one hunhundred will understand and greatly enjoy. I confess to a humiliating ignorance of grand opera German, French, Spanish or 'Oyetalian.' If the dear, good woman, through the frenzied desires of the public, expressed and coveyed to her manager by our only and own Major Anderson, can be induced to sing in good United States, this writer and thousands of others will never cease to bless her memory."

It may interest our readers to hear of the efforts made by the State Normal School in building up a filial normal at Hays City on the part of the old Fort Hays reservation given to that school. The new school will be an auxiliary school, or, as they call, like schools in the East, a "feeder" to the Emporia school. The regents have for the first year, as appropriated by the State legislature, $7,000 to begin the school. At Hays City are buildings, formerly the old fort buildings, which will be remodeled for the Normal School at that place. Work will begin immediately on the buildings and school will begin there next September. As principal of the new school the regents appointed William S. Picken, who is now associate professor in history and Latin at the Normal. Miss Anna Kelly, who has had a great deal of experience in teaching, and is a member of the present senior class of the Normal, was appointed assistant principal of the Hays City school. The new school's cirriculum will embrace the work done in the first two years in the Normal School proper. A student on graduating at the Hays City school will be admitted to the third year of the Emporia Normal School without examination.

The Hays City *Free Press* speaks of the prairie-dog poison prepared by Professor Lantz as follows: "Last week we gave a trial of the prairie-dog poison sent out by the Kansas State Agricultural College on the dog town in our homestead pasture on the reservation. We mixed the poison with a little Kafir-corn or wheat, put a tablespoonful of the mixture on the ground at the mouth of each dog hole. They came out and ate it and every dog is dead. Several rabbits ate some of it and died right there. The College sends it out at cost, $1.50 for a half-gallon can; express thirty-five cents. This quantity mixed with a bushel of wheat will poison the dogs in over a thousand holes."

In a brief address to the students during his recent visit, Major Alvord made a statement concerning Dr. Geo. T. Fairchild, President of this institution, 1879–1897, which is worthy of being put on record. President Fairchild, with others, Major Alvord being chairman, was a member of the committee on legislation of the Association of American Agricultural Colleges and Experiment Stations which had in hand the bill which was afterwards passed by Congress, and is known as the Morrill Act of 1890, which provided for annual appropriations to the land-grant colleges. The first year this appropriation was $15,000, and it increased annually until it now amounts to $25,000 per annum. In view of the way in which the funds arising from the original land endowment had, at least in the judgment of many, been diverted from their proper object, this committee wished to guard against any such contingency in respect to the auxiliary funds which they were seeking, and Major Alvord stated that Dr. Fairchild was the one who wrote the first draft of the paragraph providing that the funds so obtained are "to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural and economic sciences, with especial reference to their applications in the industries of life and to the facilities for such instruction."

The *Kansas Commercial News*, published in Topeka, devotes a recent issue to a discussion of the resources of Marshall county in general, and its principal cities, Blue Rapids and Marysville, in particular. It speaks of our honored Regent, Wm. Hunter, M.D., and his work, in the following handsome way: "The Electric-Plaster Company is an entirely new corporation in the Blue Rapids gypsum fields. The company, which was only recently organized and incorporated with a capital of $40,000, announces that its mill will be in operation by next May. Dr. Wm. Hunter, the well-known physician and member of the Board of Regents of the State Agricultural College, is president and general manager; H. A. Russell, a prominent attorney, is secretary and treasurer; and Jesse Axtell, an expert practical plaster man, formerly with the Great Western plant, is superintendent. This company also announces that its mill will have a capacity of one hundred tons in eleven hours, which is much larger than that of any plant now in operation here or anywhere else in Kansas. They will equip the plant with the very latest inventions in plaster-making machinery

and thus be able to turn out a product at least not excelled by any mill in the country. The plan of the Electric-Plaster Company is to equip a power-house with an electric plant at the dam in the Big Blue. The plaster mill will be located about a mile north and be operated by power from the electric plant. From the same plant the company hopes to light the city. The Electric-Plaster Company has one hundred fifty-five acres of pure gypsum, the veins running from nine to eleven feet deep. It is said that ten acres would wear out any mill ever built. They are well fixed at the dam, having one hundred fifty horse power. The present plant of this company is one of the finest and looms up conspicuously at the right as you pass north on the Blue Valley railroad. It is operated at present by one hundred horse steam-power, but this is being doubled and the capacity of the mill, which is now one hundred twenty tons per twenty-four hours, will be increased and a number of improvements made. It is here that they turn out "Crystal Rock" cement, or wall plaster, and "Satin Star" finish plaster. Of late the mill has been running on orders from South America. The company which now controls this mill has three other plants operated under as many different names. They are the Salina Cement and Plaster Company, at Longford, Kan., the American Plaster Company, at Mulvane, Kan., and the Salina Cement and Plaster Company, at Acme, Texas. The promoters of the Electric-Plaster Company are solid people who have been identified with Blue Rapids in various ways for many years. Doctor Hunter absorbed York state business instincts as a child, having been born there, but twenty-three years of his life has been devoted to Marshall county. He came to this county from St. Joseph, where he was graduated from Ainsworth Medical college in 1879. As a physican and surgeon Doctor Hunter has gained a high standing in the profession, which was recognized by the Union Pacific when he was made assistant surgeon for that company's road. He is also local surgeon for the Missouri Pacific. As a business man Doctor Hunter is a shrewd executive, an untiring worker, and combines the qualities which caused Governor Stanley to see in him a first-class Regent of the Kansas State Agricultural College."

ALUMNI AND FORMER STUDENTS.

G. C. Wheeler, '95, is now the herdsman of the Department of Dairy Husbandry.

W. H. Baker, second-year student in 1901, is now head gardener in charge of the state-house grounds. He hopes to return to College next fall.

Orville Stingley ['96], one of the popular young men of our city, graduated last evening from the Kansas City Veterinary College. He has been employed as tagger in the packing-houses in Kansas City for three years and has carried his studies along with his regular work.—*Nationalist.*

Prof. Mark A. Carleton, '87, the wheat expert of the Department of Agriculture, during his visit to the Paris exposition had conferred upon him a scientific decoration by the French government. This week the Senate ratified the acceptance of the decoration tendered.

Ex-Secretary W. H. Phipps, '95, traveling representative of the Blue Valley Creamery Company, attended the State Dairy Association here last week and exhibited some of the machinery which the firm handles. Mr. Phipps has held sixty farmers' institutes in Missouri this season.

At the last meeting of the Rumford committee of the American Academy of Arts and Sciences it was voted to appropriate the sum of $300 to Prof. E. F. Nichols ['88], of Dartmouth College, for the purchase of a spectrometer in the furtherance of his research on resonance in connection with heat radiations.—*Science*.

W. H. Moore, '94, and Mrs. Elda Moore, '96, by unceasing industry have built up an extensive greenhouse business during the last two and one-half years. Their lots in the city have become inadequate and they have bought a tract of land outside at the foot of Juliette Avenue, to which they will move about July 1.

Rev. J. W. Bayles ['89] has accepted a call to the Baptist church at Onaga and will remove to his new location next week. We are much pleased that he has recovered his health and is thus able to return to his chosen field of labor. Rev. Bayles has been a very useful man in this vicinity and will be greatly missed.—*Nationalist*.

The Manhattan *Republic* speaks of one of our young woman graduates in the following handsome manner: "Miss Laura G. Day ['93] gave an address this week in Crawfordsville, Ind., before the State Wool Growers Association on 'Mutton as a Table Diet.' Miss Day has made a decided hit with her lectures in the East and is in great demand."

Harry N. Whitford ['90], assistant in botany at the University of Chicago, has been engaged as an instructor at the University of Montana Biological Station, at Flathead, Montana, during the coming summer and will conduct a class in botanical study in the region for a month. The University of Chicago coöperates with the University of Montana in this work.—*Mercury*.

Prof. William L. Hall, K. S. A. C. '98, assistant superintendent of the tree planting division of forestry, is the author of a pamphlet entitled "Forest Extension in the Middle West." It is an able work and shows a comprehensive grasp of the subject, and is full of practical information on what should be done to extend the forest area in this part of the United States. It gives a list of trees suitable to various kinds of soils and climates and how to plant and care for them, as well as the benefits of this work. The value of this work being recognized, the department of agriculture of the United States has issued a second supply of these books for distribution.—*Nationalist*.

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EDITOR-IN-CHIEF, PRES. E. R. NICHOLS
LOCAL EDITOR, PROF. J. D. WALTERS
ALUMNI EDITOR, PROF. J. T. WILLARD

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AGRICULTURE AND THE EXPERIMENT STATIONS.

THE agricultural experiment stations of the United States, which the federal government has established in the several states, have now themselves passed the experimental stage and have to a remarkable degree won the respect and confidence of the farming and allied interests which it is their function to serve. There are at present fifty-nine experiment stations more or less completely maintained by federal funds, two of which are colonial, and one in Alaska. The organization and location of the continental stations affords an interesting example of the effect of the application of political conceptions to scientific investigation.

Agriculture is simply the business of growing plants and selling their products, either directly in the form of crops, or indirectly in the form of the animal body into which they have been converted. Affecting this are soil and climatic conditions, the market, the farmer's knowledge of the plants he grows and of the best methods for marketing their products.

None of these factors has anything to do with state boundaries. The fact that wheat is grown in a certain state is of no more, nor indeed of as much, significance as the fact that it is grown along a certain line of railway. A state boundary is a fiction of some political, but of absolutely no scientific importance whatever. A range of mountains or a river, on the other hand, is of tremendous significance so far as its effect on plant life is concerned. The northern and southern boundaries for a State like Kansas, two hundred miles wide, may be of some importance scientifically, as representing whatever differences in fauna or flora may be found resulting from the rather slight difference in the mean annual temperature of the two regions. But from the standpoint of scientific agriculture there is not a tithe of the significance in such a difference north or south from the center of this State as in the two hundred miles east or west of that point. Still more strikingly is the same fact exemplified in the states of Oregon and Washington.

The significant thing to know is, not whether a given crop can be raised in the state of Oregon or in the state of Washington, but whether it can be raised in the region east of the Cascades, where there is a small annual precipitation and great evaporation, or west of the mountains where the reverse is true. What does it convey to a scientific mind to say that such and such varieties of wheat are best for Ohio or Nebraska when regional or climatic conditions within these states may furnish areas which demand wheat varieties of the most diverse character? Politically, a state is a plane surface, holding a certain number of inhabitants subject to exactly the same civil laws. Scientifically regarded, a state is an arbitrary block of territory chopped out at random, sometimes consisting of some vast physiographic domain of mountain, forest or prairie, sometimes comprising portions of all these within its imaginary boundaries.

One would naturally suppose that in the location of agricultural experiment stations the points alone considered would be physiographic and meteorological ones. For scientific purposes, for example, one station in the western fourth of any one of those portions of the earth's surface called North Dakota, South Dakota, Nebraska, or Kansas, could more efficiently solve the problems of that whole vast region than can the present four stations, each of which is located outside of the high plains area, and in the eastern part of its geographic fiction, the state, which presents in each case in the eastern and western portions, such opposing facts of climate and topography.

One would naturally suppose that a geographical area of 62,000 square miles of such very similar conditions as regards soil, temperature and physiography as is found in the New England states, would scarcely need be provided with as many stations for experiments in agriculture as the region of 262,000 square miles which we call Texas, and which contains such diverse climates as are found in the humid tropical region of Brownsville, the desert tropical of El Paso, and the high, cool, semi-arid area of the Staked Plains. Yet we find six stations in the former and one in the latter geographic area.

The inconsistency involved in the absurdly unscientific location and distribution of our experiment stations is seen by a glance at a map of the United States having the stations prominently marked. Two stations dominating similar areas, so far as agri-

culture is concerned, and of necessity dealing with precisely the same problems, are found located ten miles from each other. But because they are in the separate "states" of Idaho and Washington it occurs to nobody to be an economic waste, as it certainly would if the neighboring boundary lines were moved ten miles east or west, thereby throwing them into the same state. The location of stations within seventy miles of each other and in the midst of similar areas impresses no one as useless, so long as it is known that one is in Wyoming and the other in Colorado.

This fundamental error involved in the establishing of one of the United States experiment stations in each state, regardless of the facts of climate, soil or physiographic aspect, which may make a unit of several states for the purposes of agricultural experiment, or may subdivide one state into several wholly distinct areas so far as plant life is concerned, must necessarily be responsible for a lesser efficiency to the country in proportion to the number of stations established, than would exist if locations had been settled upon by a committee of scientific experts without any regard whatever to state boundaries.

In other words, the quasi dual nature of the experiment stations, receiving as they do their support from the federal government, while their allotment is to the states as such, to which are also left the direction and control of the experimental work, together with the appointment of their staffs, results in a regrettable lack of coördinated and economically directed work. It would seem that experiments in agriculture in the various agricultural areas of the country would be conducted to much better advantage if all of the operations of the federal experiment stations were planned, directed and controlled directly by the department of agriculture at Washington. This, in fact, is the only way in which the faults of indirection and of duplication of work could well be avoided. Under the control of the federal government the problems of each agricultural area could be assigned to such stations as were best fitted to deal with them, instead of their energies being distributed vaguely over a variety of subjects, more or less intermittently and at haphazard, as local influences or the curiosity of the individual investigators dictate.

One of the great difficulties with experiment-station workers at present is the isolation in which they labor and the limitation of their outlook upon agricultural problems in general, due to the

intense localization of their work and thought. This cannot well be otherwise, as lack of funds precludes them from the travel necessary to gain a knowledge of the work of other experiment stations and the conditions of other agricultural regions.

If the experiment-station staffs were filled by civil service appointment from Washington, and a system of transfers from station to station and back to Washington were made possible, it would seem that the resultant increased breadth of view and more comprehensive grasp of the problems of scientific agriculture would inure greatly to the benefit of the whole country. By such a system of transfers the right man to attack any given problem could be detailed at any time to any experiment station in the United States, while by a civil-service system of appointments, a constantly higher standard of efficiency than now prevails could be insured everywhere. At the present time a tendency seems to exist, if one station makes a reputation for itself in any one line of experiment, for others in the neighborhood to be stimulated to emulate, and if possible to excel its efforts, due to the influence of state pride or rivalry. A duplication of work here occurs which is often wasteful and useless. Under a federal system of control a given problem might oftentimes be divided and assigned in part to three or four stations working coördinately. The advantage of such an assignment in the case of many experiments is sufficiently obvious.

One of the difficulties in the way of the highest efficiency on the part of experiment station workers lies in the association of the experiment stations with the state educational institutions and the combination of the duties of a teacher in one of these with those of an investigator in the experiment station. As a matter of fact, the work of the teacher and the investigator cannot be wholly divorced, but oftentimes by far the greater part of the time of the experiment station men is swallowed up in the details of college duties, to the serious detriment, of course, of the work of the station. The absolute separation of the federal station workers and the state agricultural college workers, so far as their duties are concerned, need not prevent the chemist to the station from doing some teaching in soil chemistry, for example, or the professor of botany of the college from taking advantage of the work and, so far as possible, sharing the interests of the botanist of the experiment station.

The main necessities, then, for the increased efficiency of our agricultural experiment stations, in the opinion of the undersigned, would seem to be: (1) A centralized management, with the direction and distribution of all experimental work left to a single board of control, preferably to be connected with the United States department of agriculture. (2) A system of civil service appointments to positions in all federal stations, and an elasticity in the organization of the different staffs, making possible the transfer of scientific workers from one station to another, according to the judgment of the governing board. (3) The complete separation of the experimental research work of the station investigators and the pedagogical work of the college teachers of science in localities where the experiment station is located on the grounds of a state institution. This would necessitate an increased salary roll in both the college and station, but would increase the working efficiency of both in a far greater ratio.

H. F. ROBERTS.

RUSKIN, THE ART CRITIC.

THERE was formed in England, in 1849, a brotherhood of artists that called themselves Pre-Raphaelites. In principles they had left the path of the modern artists. They had had a vision of a new form of art; an art that was new to England, but not new to the Italians, as it embraced principles observed by them before the time of Raphael. These artists turned to nature for inspiration, and in her saw only what was true. They began to paint from nature only. They left the galleries where artists had long loitered, studying and copying old paintings, and looked around for subjects worthy to be put upon their canvas. The harebell growing in the cranny of the rock, the bunch of roses crowning a mountain crag, the cowslips covering the meadow-bank, life and beauty on the hill and in the valley; sunset, cloud, lake and forest—a whole panorama of loveliness spread out before them. They sought for truth and found it everywhere. Criticisms and rebuffs were hurled at them by those who followed rules for form and composition. They stopped their ears and went on with their work. This revival brought into notice a young art critic, whose name was not unknown in literary circles. The greatest vindicator of Pre-Raphaelism was John Ruskin. He was so ardent in his enthusiasm that he literally thrust himself

upon these reformers and could not say too much in their praise.

We cannot say that this was the outcome of Ruskin's doctrine, but it certainly was a movement suggested by him in some of his early writings. Ruskin made many enemies by defending the cause of the Pre-Raphaelites. Like Shakespeare, he was thought an "upstart crow." After one of his letters written in defense of these artists he recieved an anonymous letter of a most hostile nature, but he was undaunted and continued to write in such a convincing manner that from this time on all subjects relating to art John Ruskin became authority. We naturally wonder how Ruskin was prepared to become the great art prophet of his generation. His life was an exemplary one. Born of Scottish parents, he inherited the shrewd common-sense and romantic sentiment found in Sir Walter Scott, while coupled with this was a passionate love for nature seen in the poet Robert Burns. His father had left his home in the Lowlands and had gone to London to make a fortune. Becoming associated with Mr. Domecq, a wealthy wine merchant, he was given full charge of a large house in London, and "Ruskin, Telford & Domecq" became the name of the new firm. Ruskin says, in speaking of this partnership, that Domecq furnished the large vineyards, Telford the capital, and his father the brains. Mr. Ruskin made long trips over England and Scotland in the interest of this business, and he always took with him his wife and son. Thus it was that young Ruskin early in life became interested in mountains, lakes and the wonders of nature. As he grew older these trips extended over onto the continent, where he saw not only the beauties of nature, but the monuments and works of the old masters.

Ruskin's father was something of an artist. When a mere lad, while attending the high school at Edinburgh, he had made a few drawings in water-color. One of these Ruskin loved to study, and it always had a prominent place over the chimney-piece in his bedroom after he moved to Brantwood.

When John Ruskin but three years old Mr. Telford gave him Roger's "Italy," a book that had just been published. This book had in it vignettes by the great English artist, Turner. The father, as well as the child, from this time became interested in Turner. On the part of the child, as he grew older, it became, as his friends expressed it, "an insanity" which never quitted him. Roger's "Italy" never grew tiresome to him, and as he sat

in his little corner in the evenings, while his father read the poems of Byron to his mother, this book, with its beautiful engravings, was spread out before him. With his ears opened to the reading, and his eyes fixed upon the drawings, we are not surprised that when he begins his juvenile literary work his poetry is modeled after Byron and his illustrations are imitations of Turner. His parents read only the best in literature, and as the child listened he not only learned the stories from Shakespeare, Byron and the other classic writers, but he got hold of the beauty of their styles.

His mother became his tutor and with great precision adhered to her plan of instruction until he was old enough to have a tutor of wider experience. Mrs. Ruskin believed in a study of the Bible, so young Ruskin was put to work each morning exactly at nine o'clock to read a morning lesson. Each word and sentence was gone over carefully, and if it was necessary to get a perfect pronunciation it was gone over several times. In this way she was able to take him through the Bible at least six times. He committed long passages, which he often quoted later in life in his lectures. He at this time formed habits of precision which are noticeable in his literary work.

His mother did not advocate the use of trifling toys, so when an indulgent aunt gave him a "Punch and Judy," it was laid away as unfit for a child of such genius. In its place he was given Roger's "Italy" and, as soon as he could read, Scott, Pope, and Burns. He was not allowed to fret or continue to ask for playthings, so when quite young he formed the habit of being contented with simple, common things. He began to study whatever came into his hands. This habit stayed with him through life. He was interested in rocks, minerals, books, and pictures, examining them to find the true worth. It is this feature that at last gave him the power to "see into the life of things" and made him England's greatest art critic. Mazini once said of him that he had the most analytic mind in all Europe.

When he was ten years old his parents employed the Rev. D. Andrews as his instructor in Greek, as by that time he had outgrown his mother's tutorage. He says in "Præterita," in speaking of this period of his education, that the doctor knew little more of Greek than letters and a few declensions; but as he had a sensitive ear for rhyme and made pretty letters the study was

of interest. Ruskin committed a number of odes, which he remembered later on when he took up the study of Greek art. These odes, as well as the art, told him that, like himself, the Greeks loved flowers and birds. His father put him through Livy, and here he noticed that the classic language was "close-set," studied, and labored, not free and flowing like Lord Byron's.

The parents seeing the child's love for drawing, employed a master to instruct him. Ruskin says of this early training that the method "broke the force of both mind and body," for he was put to work to copying instead of drawing from nature. He denounces this method as opposed to art, as it hampers and narrows the student.

Although not a brilliant scholar he was able to keep up his reading, and would have taken his degree at Oxford when he was twenty-one had not illness prevented it. He traveled abroad for two years, drawing and writing, not returning to finish his college course until 1842.

His father usually gave him as a birthday gift a "Turner drawing." On his twenty-first birthday he added to this a transfer into his name of a sum that would give an income of £200 a year. On hearing a very valuable Turner picture was to be sold the ardent young critic, without waiting to ask either the consent of his father or the price of the picture, said he would take it. His father was much grieved at his son's lack of discretion in money matters, but as this picture proved a valuable piece of property, neither Ruskin nor his father ever regretted the purchase.

At another time a Turner painting of great value was to be sold. Ruskin was anxious to buy it, but his father was abroad on business and he let it pass. He could not get over this loss, as he called it, and the more he thought of it the more he wanted the picture. One day while in this mood he wandered out into the woods and came upon a spot where nature seemed to have spread out herself to attract the artist. A little bit of ivy twisted around a thorn stem attracted his attention. As he looked, it became a well-formed composition. He took out his pencil and made a drawing of it. When it was finished he realized that for the last ten years his time had been lost, because no one had ever taught him to draw things as they really are. From that time on art was something new to him. He saw beauty in every leaf, vine, and thorn. The aspen trees in the forest, the rocks at

Fontainebleau, composed themselves into beautiful lines. The imagery of the Greeks could not be compared to nature. Between his mind and the visible world a new bond was formed. It was this awakening that produced the new thoughts in his second volume of "Modern Painters;" it was this that made him an earnest advocate of the Pre-Raphaelites.

His first volume of "Modern Painters" he began when still a lad. He had seen a collection of Turner's paintings when in Italy, and feeling that he was not properly appreciated had espoused Turner's cause in this book. By the time the second volume appeared he was an acknowledged critic. His third and fourth volumes showed an attempt to find the philosophy underlying old paintings. He looked into architecture to see the character back of it. He claimed the character of a nation is shown in its buildings. To prove this, he cited to the architecture of the Renaissance where wealth was displayed without any show of virtue. In his analytical way he looked at the soul of all art and was able to see in it the motives that prompted the execution.

As he grew older he took up the question of labor and commerce. He criticised England for driving men underground to work in dirty coal mines. He said this not only took the workmen from a world of beauty, but it destroyed a bit of green grass or a flower-dotted meadow by turning it into a dumping-ground for ugly, black refuse. He would have all labor seem beautiful. He claimed spiritual good was sacrificed for commercial good, and that England lost rather than gained when she changed beauty for money. His series of articles to the workingmen continued for about twenty years. They may not all be practical, but they contain beautiful thoughts and are good in purpose. He was professor of fine arts for fifteen years and his life was always active and helpful. He moved to Brantwood in 1872, where he lived until his death, two years ago.

With Ruskin's death passed away the last of the Victorian cycle of writers. He was born in 1819, the year that gave England's greatest queen, and also marks the birth of James Russell Lowell, who holds among men of letters as lofty a place as Ruskin. Like him, Lowell was a great critic; like him, Lowell had truth for his ideal.

Ruskin as a writer had many faults. His mind would turn from a subject, often before it was finished, and this is the reason

many of his works are not well rounded. Mr. W. H. Harrison for more than thirty years revised his works and looked after all matters of grammar and punctuation. His father, as long as he lived, attended to all business dealings. No doubt it was with pride that he carried forth to the publishers the first effort of his gifted son. Ruskin was fond of home and country. He once said he could not for a couple of months live in a country like America, so miserable as to possess no castles.

'Tis said "no man is a prophet in his own country," but the numerous societies formed in England to study Ruskin's principles testify that his thoughts, whether perfectly understood or not, are being stamped upon the national mind. They may seem to many Utopian; but that marks a great mind, for a man's reach should exceed his grasp, or what's a heaven for?

MARY E. BERRY.

USE OF PETROLEUM FOR STEAM GENERATION.

THE discovery of oil fields in California, and later in Texas, has resulted in a marked increase in the use of petroleum as a fuel for boilers. Two grades of oil are used, crude petroleum and residuum or fuel oil. The first mentioned is the oil as it comes from the well; the second, the product remaining after the distillation of benzine, gasoline, and kerosene.

Crude petroleum is the most frequently used and, if handled carefully, is safe. It has, however, a comparatively low flash point and, in case of accident, may catch fire. Furthermore, the crude petroleum may contain different proportions of benzine and kerosene, and in consequence the burners, draft, storage and safety devices suitable for oil from one locality may be utterly unsafe for use with oil from a different place.

The oil found in Russia contains a low per cent of volatile constituents and is better adapted for fuel purposes than are American oils. The western oils of the United States are better for fuel than for lighting purposes, while the eastern oils are so high in volatile constituents that a greater profit is to be made by distilling off the lighting oils and manufacturing mineral lubricating oils from the residuum. The residuum or fuel oil is better for firing under a boiler because of its safety.

In using oil for fuel, the following general plan is practiced. The oil is stored in a tank so located that the surface of the oil is

below the level of the boiler room floor. From this tank small quantities are pumped to the feed tank, which is about ten feet above the floor. From the feed tank the oil passes to the burner, through which it is drawn by a jet of steam. Heated air is also drawn through this burner.

The advantages claimed for oil as a fuel are: (1) The fire can be controlled readily, and the steam pressure be thereby held constant, or easily regulated to suit any variations in load, and consequent steam consumption. (2) The fire can be started quickly and can be extinguished instantly. (3) There is no loss of heat in the furnace due to the opening of fire doors, as is the case each time fresh coal is fired. (4) The capacity of the boiler is increased. (5) There is a saving in wages of attendants, because fewer men are required for firing, and there are no ashes to be removed. (6) The nearly perfect combustion obtained results in a smokeless chimney. (7) The absence of sparks and cinders takes away the danger of setting fire to adjacent property —an important consideration in the case of locomotives.

The disadvantages are: (1) The cost, per pound of water evaporated, is usually greater. (2) The supply is, as yet, uncertain. (3) The burners make a roaring noise. (4) There is a deposit of incombustible matter on the heating surfaces. This deposit is harder to remove, and is otherwise more objectionable, than that resulting from the combustion of coal. (5) The necessity of maintaining an auxiliary plant, using coal, for starting the fire. In addition to these objections, the use of crude petroleum necessitates the installation of expensive safety devices and is frequently accompanied by a disagreeable odor.

The tests so far made on oils for fuel have been on crude petroleum from the western and residuum from the eastern fields. The Rapid Transit Co., of St. Paul, made a series of tests to determine the relative cost of oil and coal as fuels. They found the cost to be the same with oil at two and one-fourth cents per gallon and coal, of average evaporative power, at $3.85 per ton. This result makes allowance for the greater expense of firing the coal and the cost of removing the ashes.

Tests made during the months of November and December, 1901, by Professor Denton, of the Stevens Instiitute of Technology, show that, if we consider all grades of coal to sell for $3.00 per ton, oil, to be equally cheap, must sell for from one and three-

tenths cents to two and one-tenth cents per gallon. In this statement no allowance is made for the greater cost of firing coal.

A test of one week's duration, made at the South Chicago Steel Works, to determine the relative cost of labor with the two fuels, showed that twenty-five men were required when coal was fired while six men were sufficient when oil was used. This effected a saving of $38 a day, the wages of the men being $2 per day. In this test 2731 barrels of oil did the work of 848 tons of coal.

E. B. McCormick.

JUDGING HORSES.

The past week of the judging school was devoted to horses, with J. W. Robison, of El Dorado, instructor. Monday and Tuesday draft mares were studied. Wednesday the students were given a test in judging draft teams and farm teams. In the ring was a team of registered Percheron mares owned by Henry Avery & Son, of Wakefield; the Manhattan Transfer Company had two choice teams, and the College team of black Percheron mares that weighed 1900 pounds each. The teams were shown in handsome, brass-mounted draft harness.

Draft stallions had the ring Thursday, and both judge and students gave first place to the imported Percheron Dublin, the horse for which Henry Avery & Son, of Wakefield, Kan., paid $5,000 as a colt to head their herd. As close seconds came the imported Shire owned by the Manhattan Transfer Company and the Percheron owned by John Warner, of Manhattan. Friday opened with a parade of over forty fine horses. The parade was led by the College band in full uniform and was viewed by more than fifteen hundred students and visitors. In the parade were some of the best horses in the State, representing draft, farm, coach, carriage, trotting, saddle and ladies' driving horses.

Trotting and saddle horses were judged by the students on Friday, Doctor Mayo assisting as instructor. The most notable horse in this ring was the great imported French coach stallion owned by A. W. Turner, of Manhattan. This horse has won more prizes than any other horse of the breed in the United States.

O. L. Thisler, of Chapman, gave the instruction in ladies' driving horses and in draft colts. Saturday sixteen horses of different types were placed in the ring and each student had to select from the group the best draft team, carriage team, saddle horse, and ladies' driving horse. Mr. Robison followed the students and made his selection for each class.

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LOCAL NOTES.

The *Kansas Farmer* of last week publishes an illustrated article by postgraduate student W. H. Olin, on "Judging Hogs at the Agricultural College."

Mr. C. L. Boynton, assistant State Y. M. C. A. secretary, in charge of the student department, is here inspecting our College association and aiding the boys in planning for next year's work.

President Nichols returned Sunday from a four-days' trip to Morton county, where he had gone to look up some bonds. The trip was a severe one, as he had to make about sixty miles by overland stage, facing the ugliest, windiest weather of the month.

Among the items that were crowded out of the last number of the INDUSTRIALIST is the following: The freshman class gave a reception in Domestic Science Hall on Friday night, March 14. All who attended report a good time. The freshmen always have a good time.

The Manhattan *Republic* of last week announces that W. R. Smith, its publisher, has sold that paper to M. S., W. A. and E. M. Amos, of this city, who will conduct it as an independent republican sheet. Mr. Smith will reënter the newspaper business as soon as he can find another location.

The annual exhibition of the Webster society, given last Saturday night in the College chapel, fully sustained their high reputation of the past. The progam consisted of a play, "Richelieu; or The Conspiracy." The musical part of the program was rendered by the Webster band comprising seventeen pieces, under the management of A. D. Brown.

Superintendent Huxtible, of the Wichita division of the Continental Creamery Company, was at the College on Thursday and engaged several of the dairy students for work in his territory. Supt. W. H. McKinstry, of the Topeka division, was also here during the week, arranging for several of the students to work in his district.

The Department of Domestic Science has lately received, through the kindness of the well known Topeka dry-goods firm of Crosby Brothers, a very handsome collection of tapestries and upholsteries kept in stock by that firm. The collection consists of about seventy-five samples of all makes and color combinations, and will prove very valuable in the course in house furnishing.

The roof on the new Physical Science Hall is beginning to assume shape and the northwest wing is receiving its slating. Two more weeks of favorable weather will see the roof completed.

Captain McDowell returned Friday evening from Manhattan, where he had been attending a meeting of the Regents of the Agricultural College. He was highly gratified with the complimentary reference to the College and its work which came from those who were attending the State Dairy Association meeting. Naturally, he thinks these compliments are worth something, as they come from successful men who ought to know whether the instruction given is of a practical sort.—*Smith Center Journal.*

The members of the assignment committee are busy assigning the students for the spring term, which will open on April 1. The work is being done as follows: Professor Willard assigns the seniors, Professor Walters the juniors, Professors Howell and McIntyre the second years, Professors McKeever and Remick the first years, and Instructor Ada Rice the preparatory students. The work of assigning is by no means merely clerical and it is no small task to investigate the standing of the hundreds of students and place them on programs where they can do themselves the most good.

ALUMNI AND FORMER STUDENTS.

Invitations are out for the wedding of Miss Marie Hjort [second year, '01], of Alta Vista, and Floyd Howard [fourth year, '01], of this place, which will occur March 26.—*Nationalist.*

The *Herald* announces the marriage of J. O. Tulloss, '99, and Miss Norma Lewis, at Sedan, Kan., March 12 Also that of A. C. Peck, '96, to Miss Ludia Linduff, of Norman, Okla. Mr. and Mrs. Peck will live at Francis, I. T.

Ten graduates of the K. S. A. C. met on February 21 in Washington, D. C., at the home of Mark Carleton, for the purpose of organizing an association of K. S. A. C. alumni who are in the national capital. Those present were Mark Carleton, Wm. L. Hall, Mrs. Gertrude Lyman-Hall, C. F. Doane, Mrs. Margaret Carleton-Doane, J. B. S. Norton, Mrs. Gertrude Havens-Norton, C. P. Hartley, C. A. Scott, and Z. L. Bliss. A constitution will be drawn up and the association furthered as soon as possible.—*Mercury.*

NOTICE TO CONTRACTORS.

Sealed bids for constructing an addition to the Library building at the Kansas State Agricultural College will be received at the office of the undersigned till 2:30 P. M., Tuesday, April 15, 1902. Bids must be accompanied by a certified check for $500, payable to the Treasurer of the College, as a guarantee that the successful bidder will furnish a satisfactory contract and bond. Plans and specifications are on file in President's office at the College. Bids must be sent in on blanks found with the plans. The right to reject any or all bids is reserved.

E. R. NICHOLS, Manhattan, Kan.

Volume 28. Number 24.

THE INDUSTRIALIST

Historical Society

ISSUED WEEKLY BY

KANSAS STATE
AGRICULTURAL COLLEGE

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EDITOR-IN-CHIEF, PRES. E. R. NICHOLS
LOCAL EDITOR, PROF. J. D. WALTERS
ALUMNI EDITOR, PROF. J. T. WILLARD

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THE INDUSTRIALIST.

VOL. 28. MANHATTAN, KAN., APRIL 1, 1902. NO. 24

THE COMING KANSAS CORN CROP.

A KANSAS man gives warning that none of the corn produced in that State in 1901 will yield good results if used for seed this year. He says that *it may germinate and produce a thrifty stalk, but there will be no ears, because the tassels were scorched by the intense heat of the great drought last year.* This is a sufficient hint to the farmers of this entire region to *test their seed corn before planting it.* Every experienced farmer knows how to take this precaution.—*Nebraska Journal.* [Italics are ours.]

Items similar in character to the above clipping have been going the rounds of a number of the papers in this region of late. Whoever the "Kansas man" may be who stands responsible for this remarkable piece of information, he is evidently ignorant of the first principles of plant life in supposing that a drought of one season can so affect the seed borne in that season that it will not produce plants that will bear seed the following year. The assertion is such a glaring and ridiculous absurdity that ordinary common sense, properly used, is all that is needed to expose it. The fact that the tassels *were* badly scorched on the corn of last summer was responsible in part for the short crop, because the tassels produce the pollen necessary to fertilize the young grains on the ear. The pollen grains fall in a shower and are carried by the wind to the "silk." When lodged on the silk they germinate and send slender little tubes down to the grains, to each one of which a thread of silk is attached. Entering the grain, the pollen tube reaches the ovule within, and finally fertilization is effected by means of a "sperm cell" within the pollen tube uniting with the "egg cell" in the ovule. As a result we have the young embryo corn plant, which lies embedded within the "germ" of the kernel until planted.

So long as there is a live embryo in a seed, that seed will germinate. Provided there is plenty of food material in the seed for the embryo to feed upon while germinating—that is to say, so

long as the seed is not shrunken—the young plant will grow vigorously. So long as the weather conditions are not adverse, the plant will reach its normal height and will produce ears with grains and silk, and a tassel bearing the pollen. So long as no hot winds come to wither the silk and the pollen, or cause the half-grown kernels to shrink, there will be a corn crop. The drought of any season may decrease the number of fertilized grains on the ear that season, and may stunt the development of any of the fertilized grains, but *no grain ever develops on an ear if it is not fertilized.* If a single kernel only, remains on a cob a foot long and that kernel is not shrunken—that is to say, is not deficient in food for the embryo—*that kernel will grow,* and if it grows the stalk which arises from its planting will bear other ears, and if providence and the weather permit, that stalk will produce just as many ears bearing just as many kernels as will plants growing from seed maturing in a season when there is a full corn crop.

It is, of course, distinctly to be understood that a test to determine the percentage of vitality in seed of any kind is necessary where any doubt exists as to the life of the germ. In the case of most seed kept two or more years in stock, this is always advisable, and in the case of Indian corn, absolutely necessary. The method is simple and is in brief as follows: Select one hundred seeds of the variety in question, taking care to exclude shrunken or shriveled grains and the seeds of weeds. Place them between two layers of thick flannel, well moistened, and keep the whole in a covered dish for a couple of weeks at the temperature of an ordinary kitchen, taking care that the dish is always in a warm place at night. Count the seeds that germinate. If one hundred is the number used for the test, the number of seeds germinating will be the per cent of living seeds in the lot from which the sample was taken. Suppose seventy-five seeds out of one hundred to germinate; the percentage of living seed is then 75 per cent, and 25 per cent more seed than is the rule for the variety must be sown to make up for the deficiency. Let it not be forgotten that while seed testing will determine the percentage out of the total planted *that may be expected to grow, it furnishes no basis whatever for prophecy as to the extent to which those that do grow will produce seed.*

The climatic conditions prevailing in one season exercise no more influence over the reproductive powers during the next

growing season of plants from the seed which chanced to be produced the previous year than does the price of ivory in Borrioboula-gha.

H. F. ROBERTS.

SOME NOTES ON SUGGESTION.

A PERSONAL account of the way in which the average individual strives to direct his own thought processes is exceedingly interesting. While it is true that there are many who give little or no effort toward directing the trend of their thoughts, giving themselves up wholly to chance association, there are others whose career in a social, moral or business way can be traced more or less directly to autosuggestion as a factor. It is recognized as a good maxim that "as a man thinketh so is he." That is to say, one's conduct is a direct expression of his dominant thought. He lives out in mental pictures his characteristic acts before they are performed. But whence come these mental pictures? Are they forced upon us, or do we create them at will? Or, is a compromise between these two contraries nearer the truth? And, if the latter view is the correct one, what can be done to increase the ability to create mental images at will, and thereby direct one's own thought processes and form one's own character?

The mind of the crowd is different from that of the individual in that it shows the effects of contagion. The opinion of the individual is temporarily swept away by the force of the unified sentiment of the crowd with which he is acting. The crowd is quick to act upon forceful suggestion. The war cry, or the watchword, or the "slogan," as the case may be, must be simple and capable of easy translation into concrete mental images, and the action will be performed with little or no reasoning. Thus, such expressions as, "On to victory," and "Stand up for the party," have done wonders in unifying the action of the masses. This is a form of hypnotic suggestion, pure and simple.

It is also easily shown that some individuals acting alone are easily moved by hypnotic suggestion. A strong, forceful statement of personal application is made, crowding out of the consciousness of the susceptible person the old image, and creating a new one. As a result the conduct of such a person is at least temporarily changed. When the priest said to Jean Valjean, "You belong no longer unto evil, but unto good! I have bought your soul to-day and given it unto the good!", the latter's whole

character was transformed. He became a new man. I believe in the effectiveness of this method of reforming evil-doers, especially those whose characters are yet in the formative period.

I believe also that there is power and efficiency in autosuggestion. The one who is a positive force in the world carries constantly in mind strong suggestions of personal worth. They may never be uttered in words but the thought is ever present, although the person may never have become aware of this fact. Moreover, conscious effort in this direction is also possible and helpful. The one who lacks self-confidence and decision will be helped by making to himself strong affirmations of courage and steadfastness. The one who is nervous and excitable should speak to himself in quiet, soothing sentences; and the person of sluggish temperament, in such a way as to accelerate his movements. In corroboration here recall the strong, positive affirmation of the great emperor, Julius Cæsar, "I am fixed as the northern star!"; and of the great reformer, Martin Luther, "Here I stand! God being my witness, I cannot do otherwise!"; and of the great evangelist, Dwight L. Moody, "I simply take God at His word!"; and of the great Savior of men, Jesus Christ, "I and my Father are one."

It behooves every one who is interested in self-culture to inquire into his own case with reference to autosuggestion with a view to strengthening his personal character, both by supplying positive aids and by removing possible hindrances.

The self develops in accordance with the nature of the mental food. The man whose mind is centered upon some high ideal draws upon all the available sources of supply for the means of his development. His power is cumulative. He is magnetic. Everything that he touches in his environment adds to his own strength and in turn receives an influx of spiritual light from him. It will be found that in working out his ideal he either intentionally or inadvertently "suggests" to himself in strong, clear statements of personal advantage. In proportion as he does this the ideas that retard and hinder progress will drop out of mind and their evil effects be no longer seen. Herein lies the secret of progress and of power, for the one who has learned to control the factors that enter into his mind unfoldment has found the key to success. All things are at his command.

W. A. McKEEVER.

PASTURE WEEDS, THEIR PREVENTION AND ERADICATION.

(Press Bulletin No. 113, issued from Botanical Department.)

THERE is constant demand nowadays for information concerning measures for keeping weeds out of grazing land. Weeds are generally plants that have become adapted to living in many climates, on many soils and under various conditions. Some of them are truly cosmopolitan, being found in almost all countries. Their transportation to other countries is usually due to man, a very common means of distribution being through accidental mixture with grain, vegetable or grass seed. Railroads, particularly through the freight trains, carry seeds of weed plants from place to place. In such ways weeds suddenly come to appear in new and unexpected regions.

The dominant vegetation existing in any section of country, if left to itself, usually repels invaders. The reason that certain kinds of plants only are found growing predominantly anywhere is because, for the time being, they are best fitted to survive under local conditions. Those less well fitted are crowded out, and perish. In an old plant region, as a forest or a prairie, vegetation of a particular sort has established itself as the result of centuries of competition with other plants contesting for the same space. Seeds of invading species, however, may lie dormant for some time in the soil, awaiting the clearing of the land to germinate and grow. Notice the new plants that appear where land is cleared of trees or sod and left to itself.

So long as the conditions in nature surrounding the wild prairie grass remain the same, they will continue to grow in about the same proportions and to about the same extent. Man, however, changes natural conditions violently. By breaking sod and putting in crops he opens places which afford room for strange plants, weeds, the seeds of which are carried thence to neighboring grazing land. Even then they will not drive out the wild grasses if the latter are left to themselves. On the contrary, if a farm is abandoned, weeds may riot for a few years on the broken land, but the sod retakes the soil eventually in the prairie regions, and the weeds are crowded out.

The most common cause of weed invasion of native pastures is overpasturing, whereby the wild grasses are kept down so that they cannot compete with the weeds. The latter being unpalatable usually are left undisturbed by the stock. Sometimes these

are introduced weeds never found on the prairie, as iron-weed snow-on-the-mountain or milkweed, horse weed, and thistle. Others are tough prairie perennials growing among the grasses, but not spreading greatly unless the latter are kept down.

Prevention of weed-invasion of pastures is generally perfectly possible by grazing fewer head per acre. Compare the number of weeds in a prairie pasture with those in an adjoining piece of similar land not grazed but kept to be mowed for hay. What number of stock per acre can be safely grazed depends on the region. In the "short-grass" country fifteen to twenty acres per head must be allowed. In central or eastern Kansas two and one-half acres per head is perhaps a limit. Every farmer can tell by observation when weeds are coming in. If so, it is a sign to reduce the number of stock per acre. No man can afford to raise stock in such numbers that they use up the capital itself (the land) by killing out the pasture grasses which make it valuable, instead of consuming the interest only.

Eradication of weeds already present in pastures depends on the particular case. Annual weeds can be killed out by mowing before seeding. This may have to be repeated several times during the growing season, as many of them will send up new sprouts. In the case of biennials or perennials with tap roots, cutting the latter under ground and beneath the "crown" is effective. Perennials like the bind-weed, which spread by underground stems, are extremely difficult to deal with because every bud on such a stem is capable of growing into a new plant. Plowing under simply spreads the plant by cutting the propagating stems and scattering the pieces. No very satisfactory way of eradicating weeds of this kind can be given that will apply for all cases and conditions. A straw mulch, by excluding the light, will sometimes kill them. Common salt applied to the soil is effective, and arsenite of soda, one pound dissolved in eight quarts of cold water, is recommended. This can be obtained of wholesale druggists at ten cents per pound. Of course, any chemicals that will kill weeds will kill all the other vegetation for several months. Chemical methods of weed extermination, then, should be used only as a last resort and under expert advice.

All bulk seed purchased should be carefully cleaned before sowing.

H. F. Roberts.

BASES OF NUMERATION.

DID you ever try to count without referring to some base, or try to write the number fifteen? Count to twenty, then increase it to fifty, and you will be ready to appreciate the difficulty the savage and primitive man had in counting. It does not matter what number is selected as a base, but one is essential. To be a good base it must be neither too large nor too small, and should contain as many factors as possible. So with ten as the radix of our scale we have a very convenient one.

We are so familiar with this base and it seems so simple, so natural, that we forget all other systems. Some have gone so far as to call it the "very essence of simplicity." Yet, when we stop to think, there is nothing natural about it, unless we think of the fingers on a man's hand. Had we been created with six fingers, including the thumb, on each hand, our base would have been duodecimal.

We will enumerate a few of the scales that have been used and some that have been proposed by different men.

BINARY.—In using this base only two symbols are necessary, 1 and 0. It was proposed and advocated by Leibnitz some two hundred years ago. He wrote an arithmetic based on such a scale and called it the *Binary Arithmetic.*. He claimed that it was the most natural and simple, and that in it were the manifestations of Deity. Unity representing God and zero chaos, out of which God created the universe, so all numbers are created with one and zero. All operations would be performed additively, thus: We would represent 2 by 10, 3 by 11, 4 by 100, etc. An objection to this base is that if we wish to write a large number too many figures must be used. Sixteen, for instance, would be written 10000.

It is interesting to note that such a base has been used, though unknown to Leibnitz, among the savages of Australia and of a few countries in South America.

QUINARY.—This is the most primitive base and is in daily use among civilized and uncivilized people to-day. It is quite natural to count the fingers on the hand, call the collection a "hand," repeat the operation on the other, call this "two hands," and so on. Natural as the system seems, very few savage tribes have used it. The Eskimos use it, but they have a separate symbol for five. It is so related to the decimal that it invariably has been incorporated with it.

SENARY, OR SEXIGESIMAL.—Historically considered, very few savages, if any, have used it. It was recommended by Lehman, who argued that we would have less symbols to memorize, less tables in multiplication to commit, and that it is divisible by more factors than the decimal. There are traces of a sexigesimal system in the division of the circle into grades.

DUODECIMAL.—If a new base were to be adopted, the duodecimal would undoubtedly be the one chosen. It possesses the property of divisibility, having as factors 2, 3, 4, and 6, numbers frequently used in simple computation. Furthermore, the simple fractions could be represented conveniently as twelfths, most of them requiring only one or two figures. The following table taken from the "Philosophy of Arithmetic" gives a comparison with the decimal.

DECIMAL SCALE.		DUODECIMAL SCALE.	
$\frac{1}{2}=.5$	$\frac{1}{6}=.1666+$	$\frac{1}{2}=.6$	$\frac{1}{6}=.2$
$\frac{1}{3}=.333+\ldots$	$\frac{1}{7}=.\grave{1}4285\grave{7}$	$\frac{1}{3}=.4$	$\frac{1}{7}=\grave{1}86\S 3\grave{5}$
$\frac{1}{4}=.25$	$\frac{1}{8}=.125$	$\frac{1}{4}=.3$	$\frac{1}{8}=.16$
$\frac{1}{5}=.2$	$\frac{1}{9}=.1111+$	$\frac{1}{5}=.\grave{2}49\grave{7}$	$\frac{1}{9}=.14$

The symbol § is introduced to represent 10. Mr. Brooks also introduces II to represent 11. He is a strong advocate of the new base and hopes to see the day when it will be adopted. To change the base would necessitate the introduction of two more symbols, either the above or some others. 12 would be written 10, 13 = 11, 14 = 12, etc. King Charles XII, of Sweden, while in the trenches on the border of Norway, contemplated the introduction of the duodecimal scale in his dominions. Those who may be interested in the basis of numeration will find the "Number Concept," by Conant, "The Philosophy of Arithmetic," by Brooks, and Cajorie's "History of Mathematics," interesting reading.

WM. ANDERSON.

EDITORIAL BOUQUETS.

IN HIS write-up of the meetings of the State Editorial Association held in Manhattan recently, Gomer T. Davies, of Concordia, president of the association, has the following to say of the College, in his paper, *The Kansan*, February 13:

"Early on Tuesday morning plenty of busses and carriages were provided to take all the editors, their wives, and sweethearts, out to the Kansas Agricultural College. We got there in

time to attend the regular morning exercises at the chapel. Governor Stanley was a member of the party. On arrival at the College grounds a salute was fired from the cannon owned by the College and manned by military companies composed of students of the College. These companies were all drawn up in military array and put through the evolutions for the entertainment of the visitors. At the chapel was an inspiring scene. Room was reserved for the party of editors; every other seat was occupied by a student of the College. The splendid acoustic properties of the chapel lent added charm to the excellent music of the College orchestra. The president of the College read a short Scriptural lesson and offered prayer. Instead of the usual morning hymn the students and their guests joined in singing "America," accompanied by the full orchestra—"it was good to be there." Colonel Anthony, Governor Stanley and the president of the Editorial Association each made short addresses. The marching of the students in leaving the chapel, at the close of the exercises, is nigh worth a trip to Manhattan. We were told that there are thirteen hundred at the College, yet such excellent discipline is maintained that everything moves as smooth as clockwork.

"The editors were shown through all the various departments of the College, which we cannot spare the space to describe even in a general way. It is sufficient to say that we learned much of which we had little idea before, concerning one of the greatest of our State institutions. . . . The College has a military band —an excellent one—of about forty-five pieces. . . . We were informed that there are no joints or saloons in Manhattan—a commendable thing for a college town especially. . . . If any editor present ever 'knocked' on the Agricultural College heretofore, he wont do so any more. They now say it is a good thing."

The Sedgwick *Pantagraph*, edited by Mark P. Cretcher, says the following: "There is an institution located at Manhattan, however, of which every loyal citizen of Kansas should feel proud —the Kansas State Agricultural College. This College is an institution that should be better known throughout the State, and be encouraged and patronized by our people, for it is doing a grand, good work. It is making practical, reliant, industrious men and women of the boys and girls who attend, and fitting them for the places they will take in life's battle in a way calculated to be of the greatest practical merit."

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Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

President Nichols was up to Hays City Monday, looking after College business.

The regular monthly sale of the Manhattan Live Stock and Sales Company will be held Saturday, April 5.

Otto Purdy, '99, is now assistant business manager of the El Reno(O. T.) *American*, a daily paper and job office.

Professor Walters is booked for a lecture on landscape-gardening before the Shawnee County Horticultural Society.

Schuyler Nichols, '98, of Liberal, Kan., was about College Saturday shaking hands and commenting on late improvements.

The Department of Industrial Art has lately received a number of samples of plain and ornamental brick from the new brickworks in Iola and Independence.

The carpenters who are working on the roof of the new physical science building have at last reached their apex. They are sheathing the pyramidal roof of the tower.

The following are the recently elected officers of the first year farmers' short course: President, R. M. Hammond; vice-president, C. King; secretary, E. Welty; treasurer, Mr. Ashcroft.

The Horticultural Department has put a team and several men at cleaning up the debris about the new building. There are several hundred loads of rock and sand material scattered about the premises.

The Leavenworth Creamery and Dairy Company was represented at the dairy convention by manager James DeCoursey. The gentleman was highly pleased with the College creamery products, and has since then ordered two large consignments of our butter, by telegraph.

The visit to the Agricultural College was one of the greatest treats accorded the association. Together with the majority of the people of the State very few of the editors were conversant with the magnitude of the work carried on by this institution of learning. The majority of those who have not visited the institution labor under the impression that the State Agricultural College is an insignificant institution, a sort of a "one horse" affair which is almost a useless drain on the State treasury. A visit to the College will convince any fair-minded person of the contrary —*Lindsborg News.*

Professor McKeever will deliver a lecture before the Northwest Kansas Teachers' Association, which will meet at Valley Falls, April 3, 4, and 5.

Regent F. D. Coburn, secretary of the State board of agriculture, and Mr. Mohler, his assistant, were at the College on Tuesday attending the beef demonstration. They were the guests of E. B. Purcell and family.

A number of students who had been trifling with their College work for some time were brought to a sudden realization of their condition last week when President Nichols publicly announced their suspension from all College privileges. Five unexcused absences constitute the danger line and ten mean suspension.

Professor Walters took his class in home architecture down town last Wednesday morning to show them the model residence of Mrs. Wharton. The students were delighted with the perfect arrangement and the many modern conveniences of the beautiful home, and voted it the best arranged house they had ever seen.

Dr. S. C. Orr, Manhattan, took twelve photographs of different cuts of meat as shown at the beef demonstration last Tuesday. While all of Dr. Orr's work is good, these photographs are his best work, as they are almost perfect, and the subjects were unusually difficult to handle. The Doctor also made front and rear views of the six steers used for the beef demonstration before slaughtering. Expert representatives of the leading live stock journals of the West attended the beef demonstration and were unanimous in declaring these photographs as good work as they had ever seen.

Assistant A. T. Kinsley, of the Veterinary Department, has resigned his position to take up higher work in his specialties in the Kansas City Veterinary College. Mr. Kinsley is an energetic young scientist and an effective teacher, for whom we predict success in any branch of scientific work which he may choose to take up. He has had charge of the bacteriological laboratory of the College for several years and has prepared and sent out hundreds of thousands of doses of blackleg vaccine and other preparations. Mr. Kinsley will teach microscopic work while at the Kansas City college. His new work will not take him away from here until about September 1.

Hon. J. W. Robison, the judge of the judging school of horses held week before last at this College, is probably the largest farmer in Kansas and the most extensive breeder of draft horses in the West. His farm in Butler county comprises seventeen thousand acres and his herd of horses numbers several hundred high-grade animals, among which are sixty full-blood imported Percheron mares. He sends hundreds of barrels of apples directly to Europe every year. He follows a very interesting system of farming, which he explained to the agricultural students in a lecture on Friday morning. He has an alfalfa field of a thousand acres, a corn-field of twelve hundred acres, fattens fifteen hundred steers every year, and has eleven orchards.

We wish to compliment the editors of THE INDUSTRIALIST on its State Dairy Association Souvenir Number containing the program. It is the first program we have seen which is worth preserving, giving much useful information, such as advice as to pastures by Professor Otis, history of the dairy association by T. A. Borman, a call for participation in the six months' contest by Ed. H. Webster, the rearing of calves by Professor Otis, pictures of typical cows and bulls, a list of creameries and cheese factories in the State, etc., etc.—*New York Produce Review and American Creamery.*

A correspondent of the *Kansas Farmer* has the following to say about the work in swine judging last week: "The swine-judging school at the State Agricultural College is in progress. Three hundred fifty students taking the agricultural course are studying the breeds of swine and fat hogs. It is a delight to see the enthusiasm manifested and the interest by the students in scoring and judging stock. Professor Cottrell and Professor Otis deserve the hearty approbation of the breeders and farmers of the State for their special efforts in inaugurating the study and judging of stock in the agricultural course, and should receive encouragement and support by all who believe in improved stock and advanced farming to continue and extend the work along these lines at our Agricultural College. The animals representative of various breeds at the College farm are fairly good. Improvement should be and will be made as time and opportunity permit. In the matter of subjects to be used as object-lessons and models of animal form, 'the best are none too good.'"

Four hundred fifty students and two hundred visitors were present at the beef demonstration by Mr. John Gosling in the judging room last Tuesday. The room was crowded to its utmost capacity and the audience was so interested in Mr. Gosling's talk that when he closed three hundred fifty people kept their seats and waited for another demonstration. Six steers were slaughtered for this demonstration, a Short-horn, an Angus, a Jersey, a Holstein, and two scrubs, and four thousand eight hundred fifty pounds of beef were spread out on tables to illustrate Mr. Gosling's address. The cutting was done by Mr. C. W. Anthony, head cutter for A. Weber, the largest retailer of meat in Kansas City. Leading members of the ladies' clubs of Manhattan, prominent stock men and many business men from town were among the visitors. Secretary Coburn and President Nichols represented the Board of Regents. Twenty papers outside of Manhattan had representatives at the College to report the work of the beef demonstration. Every daily in Kansas City was represented, as were seven papers from Chicago, three from Topeka, two from Des Moines, Iowa, one from Cleveland, Ohio, and one from Albany, N. Y. Every visiting correspondent expressed surprise and delight at the large attendance at the College, the magnificent buildings, the good equipment, and above all the thoroughly practical character of the work that is being done in all departments of the College.

At a meeting of the Kansas delegates, held at Put-in-bay, during the twenty-third annual convention of the M. I. N. A., a Kansas State organization was temporarily formed. The following officers were elected: President, Prof. C. A. Boyle, of the State Normal School, Emporia; secretary, Miss Parry Bundy, of Topeka. An executive committee was formed consisting of Prof. C. A. Boyle, Mr. B. S. Hoagland, of Hutchinson, and Miss Parry Bundy. It was agreed to hold a meeting in Topeka, April 28 and 29, for the purpose of perfecting a permanent organization. A music committee, consisting of Miss Parry Bundy, Mrs. Horton, teacher of music at Bethany College, Topeka; and Miss Spencer, teacher of voice at Washburn College, Topeka, was appointed, as was a literary committee, consisting of Professor Brown, of the State Agricultural College, Miss Henderson, of Leavenworth, and Mr. E. C. Marshall, of Wichita. There will be two concert programs and a piano recital given during the meeting, in which the prominent musicians of the State will participate. Another interesting feature will be the papers presented by some of the leading teachers of the State on subjects which will be interesting and practical. The objects of this meeting are to perfect an association which will bring the teachers of the State together in common interest to develop the musical interest of the State.

ALUMNI AND FORMER STUDENTS.

The many friends in town of Lieut. Will A. Cavenaugh ['96] will learn with much pleasure that he is again in the "States," and that with his regiment, the Twentieth Infantry, he arrived at Fort Sheridan last Monday morning. Since joining the army in August, 1896, Lieutenant Cavenaugh has climbed up rapidly until he is now but a few points from his captaincy. Into the few years, too, has been crowded more active service than most army men see in so brief a period, for his regiment has been on decidedly active duty since the first outbreak of the Spanish-American war.—*Republic.*

The war department announces that Frank W. Coe [third-year, 1888], captain of artillery, has been relieved from duty as instructor at West Point and ordered to join his corps. Captain Coe is a resident of Manhattan, and since graduating from West Point has been rapidly promoted to his present rank.—*Republic.*

NOTICE TO CONTRACTORS.

Sealed bids for constructing an addition to the Library building at the Kansas State Agricultural College will be received at the office of the undersigned till 2:30 P. M., Tuesday, April 15, 1902. Bids must be accompanied by a certified check for $500, payable to the Treasurer of the College, as a guarantee that the successful bidder will furnish a satisfactory contract and bond. Plans and specifications are on file in President's office at the College. Bids must be sent in on blanks found with the plans. The right to reject any or all bids is reserved.

E. R. NICHOLS, Manhattan, Kan.

Volume 28. Number 25.

THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE
AGRICULTURAL COLLEGE

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EDITOR-IN-CHIEF, PRES. E. R. NICHOLS
LOCAL EDITOR, PROF. J. D. WALTERS
ALUMNI EDITOR, PROF. J. T. WILLARD

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Eleanor Harris, Assistant in Music.. ———
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THE INDUSTRIALIST.

VOL. 28. MANHATTAN, KAN., APRIL 15, 1902. NO. 25

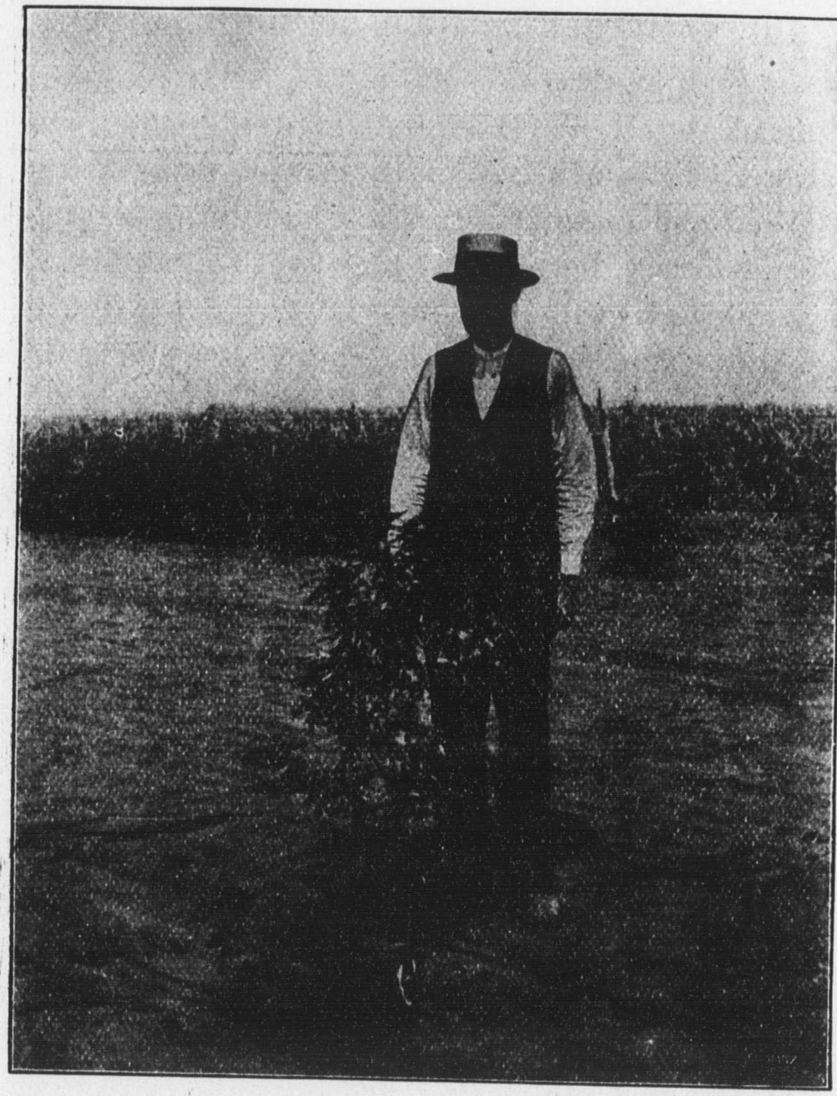
THE CAMPBELL METHOD OF SOIL CULTURE.

THE Campbell method of soil culture is the practical application made by H. W. Campbell, of well-known principles of conservation of moisture. As early in the spring as the ground can be worked and immediately after each crop is removed, Mr. Campbell pulverizes the top four inches of soil as finely as possible with a disk harrow. This finely fitted surface soil is turned down into the bottom of a furrow six or seven inches deep. In summer the disking is done the same day the crop is removed, if possible. The land is plowed as soon as convenient after disking. The plow is followed with an implement called the subsurface packer. which consists of a series of wheels mounted on a shaft. The wheels are about thirty inches in diameter and are placed six inches apart on the shaft. The rims of the wheels are sharp so that they press and cut into the ground, and a six-foot machine is weighted to nearly a ton. The land is packed the same day it is plowed, and when practicable each half-day's plowing is packed as soon as it is plowed.

The packer leaves the soil firm at the bottom of the furrow and loose at the top. The firming of the bottom soil makes a good connection with the subsoil and puts the soil in such condition that the water in the subsoil is brought up by capillary action to the soil in which the roots grow. The loose surface soil, as left by the packer, forms a dust mulch that prevents the evaporation of the moisture from the surface. Throughout the season after every rain the ground is harrowed in order to maintain the mulch.

Mr. Campbell insists that four conditions must exist to secure a good crop: Good depth of plowing to increase the moisture reservoir; a thoroughly fined and compact subsurface to form a seed bed; a constant soil mulch to prevent the evaporation of moisture; undisturbed roots. During the growing season he cultivates every four to ten days, with all crops, insisting on shallow cultivation—cultivation so shallow that the roots will not be disturbed.

For the past two years Mr. Campbell has been using his system on the Pomeroy model farm, at Hill City, Graham county, Kansas. The writer of this article visited this farm in 1900 and 1901. At the first visit Mr. Campbell had his work just starting. The farmers and business men of Hill City had no faith in the new methods and frankly said that the farm selected was one of the most un-

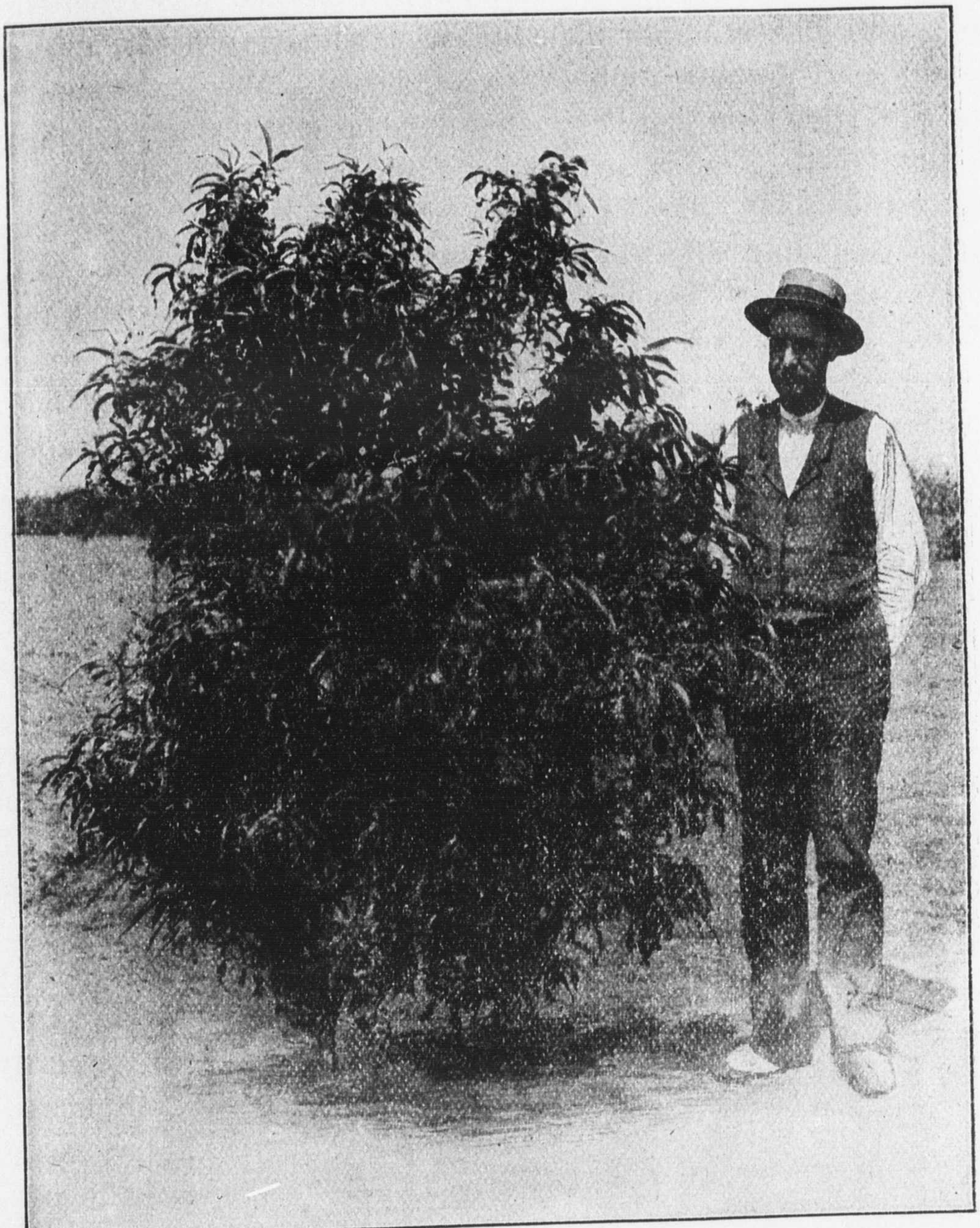


Peach tree, four months from setting, cultivated by Campbell method.

promising in the county. It is high upland, drained in every direction, with thin soil and magnesia subsoil coming within twelve to eighteen inches of the surface. Magnesia subsoil is about the poorest subsoil that we have for withstanding drought, and in a dry time crops will die out quicker on this kind of soil than almost any other. The business men of Hill City said that for six years previously there had been total failure of crops on this farm.

The first thing which attracted attention on inspecting the

fields in 1901 under the Campbell method was the perfect stand. A number of fields in the neighborhood were inspected, and in every case, except Mr. Campbell's, there was an unusually poor stand of Kafir-corn. There was frequently five to six feet be-



Peach tree, sixteen months from setting, cultivated by Campbell method.

tween stalks, and sometimes several rods would be vacant. The stand of corn was also very poor at Hill City, except in fields under the Campbell system. An auger four and a half feet in length was taken and several borings made to test the depth of moisture. With one boring dry dirt was found at a depth of four feet in fields under the Campbell system. With all other borings the

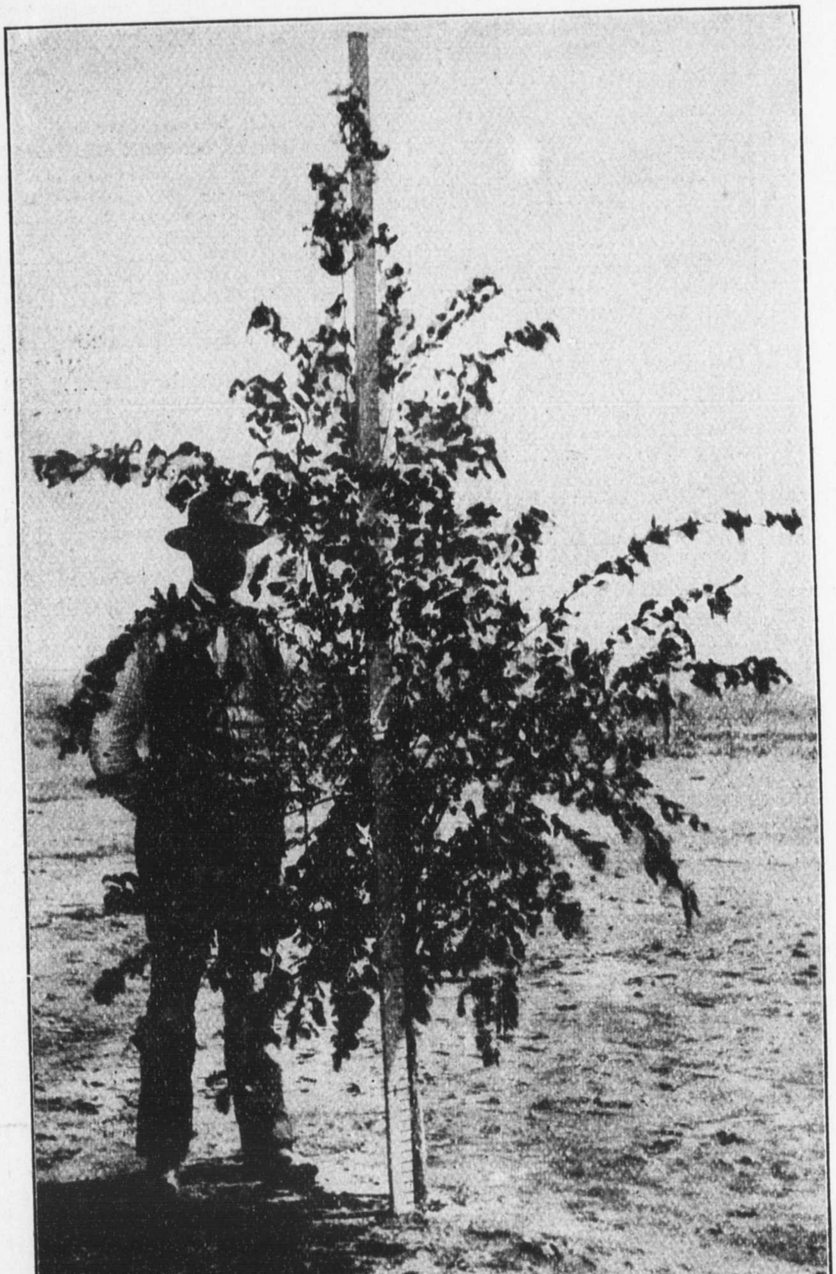
dirt was moist down to the full depth the auger would go—four and a half feet. In an adjoining field that had apparently received good ordinary cultivation dry earth was found at from twelve to eighteen inches from the surface.

Kafir-corn cultivated by the Campbell method was from eight to twelve inches higher than that in neighboring fields, and was heading. The chief trouble with Kafir-corn in the western half of the State has been that it does not develop fast enough to mature before frost. That raised by Mr. Campbell was much more advanced than any other in the neighborhood treated by ordinary methods, and promised to mature. Wheat was in the stack at the time of the visit. The old wheat ground was covered with a thick growth of volunteer wheat, with no bare places, showing the effect of the Campbell system to produce a good stand. Mr. Campbell's corn was not a failure. He secured a perfect stand, a good growth of stalks, and an estimated yield of corn of ten to twenty bushels per acre. Corn in neighboring fields was only one-third to two-thirds as tall as that grown by the Campbell method, the stand was poor, and the yield from nothing to five bushels per acre. Mr. Campbell raised better corn than his neighbors, but his corn was not a profitable crop.

For three years we have advised farmers in the western third of the State not to raise corn. In many years corn cannot be raised in that section of the State with the best of irrigation. A good growth of stalks can be secured with a sufficient supply of moisture, as Mr. Campbell secured last year, but a few days of hot winds at the time of tasseling kills the pollen and destroys all possibility of grain, although afterwards the stalks may be vigorous and stay green for weeks. Kafir corn is not so affected by hot winds and will take the place of corn in raising and fattening steers, hogs and sheep, and in feeding horses, dairy cattle, and young stock. Even as far east as Manhattan, for the past twelve years Kafir-corn has averaged yearly sufficient grain for four hundred eighty-seven pounds of pork per acre per year. Mr. Campbell's work indicates that he can make Kafir-corn a sure crop, even in as unfavorable a season as the past, and if he can, the farmers of the western half of Kansas can fatten their own steers and hogs instead of shipping them east as feeders and stockers.

The growth of trees under the Campbell system has been re-

markable. It can best be shown by the photographs. One thing which cannot be shown by the photographs is the vigor and healthfulness of the trees under the Campbell system. In 1900, when I visited Hill City, a large number of shade trees had been set



Elm tree, one year after setting, cultivated by Campbell method.

around the court-house at the same time that Mr. Campbell planted shade trees on the Pomeroy farm. Several of the business men told me that the court house trees had been kept well watered through the summer. The trees on the Pomeroy farm had no water, but had been thoroughly cultivated by the Camp-

(Continued on page 382.)

SPRING-TERM (1902) PROGRAM, SHOWING INS

INSTRUCTOR.	First Hour.	Second Hour.	Third Hour.	Fourth Hour.
Walters	Axonometric..... 31	Arch. Drawing... 3	Persp. & Sketch[4] 12	Pers. & Sketch[4] 23 Geom. Draw[4].... 15
Evans	Object Drawing.. 22	Object Drawing.. 22	Object Drawing[4] 16	....
Brown	Singing, Notation, Band, Orchestra			
Brown R. H.	Organ and Orchestral Instruments....			
Harris	Piano..........			
Willard[3]	....	....	Chem. Metals[1]... 32	Chem. Metals[1]... 20
Weida	....	....	Organic Chem.[2].. 32	Organic Chem.[2].. 20
Weber[3]	Chemical Analyses			
Mathewson	....			
Cottrell[3]	....	Tillage and Fert.. 30	....	Feeds & Feeding, 15
Shoesmith[3]	....	....		
Popenoe[3]	Geology 41	Geology 24	Entomology...... 40	....
Cramer	....	....	Zoölogy.......... 26	Zoölogy Lab...... 26
Dean[3]	....	....	....	Entomology...... 34
Remick	Calculus.......... 12	Higher Algebra.. 21	Higher Algebra.. 38	Geometry II...... 29
Anderson	Geometry II 16	Geometry I....... 25	Algebra III....... 38	Trigonometry.... 26
Bowen	Algebra II........ 32	....	Geometry I....... 25	Geometry I....... 27
Goodell	Political Econ.... 16	History III....... 36	History III....... 37	Civics............. 12
Roberts[3]	Plant Diseases... 12	El. Botany........ 44	....	....
Paull[3]	....	....	El. Botany. 50	El. Botany........ 32
McKeever	German.......... 10	Psychology....... 16	Psychology....... 15	Meth. and Man... 14
Berry	Themes.......... 23	Eng. Literature II 20	Eng. Literature II 17	Eng. Literature I 18
Rupp	English Read. II.. 30	Themes........... 33	Themes........... 24	Eng. Readings II.. 42
Rice	Composition...... 29	Eng. Readings II, 31	Eng. Readings I.. 30	Eng. Readings I.. 14
Hartman	Power Trans..... 4	Heat............. 24	....	....
Hamilton	Algebra III....... 37	Algebra III....... 37	El. Physics....... 26	El. Physics....... 26
Clure	....	Oratory II[4]....... 37	Oratory II[4]....... 20	....
McCormick	....	Thermodynamics 4	App. Mechanics.. 6	....
Sawdon	Trigonometry.... 22	Kinematics....... 23	....	Prin. Mech. 20
House	Woodwork....... 3	Woodwork........ 9	Woodwork....... 3	Woodwork....... 11
Wabnitz	Apprentices 10			
Gasser	Blacksmithing. 8		Blacksmithing.......... 3	
Ridenour	Foundry.......... 2		Foundry.......... 2	
Otis[3]	....	Breeds & Breed'g 14	Ag. Economics... 16	....
Webster[3]	Creamery......			
McIntyre	....			
Agnew	House. Econ..... 18	....	....	....
Mayo[3]	Adv. Physiology, 26	....	Adv. Physiology, 25	....
Kinsley[3]	Bacteriology..... 23	El. Physiology.... 12	....	Adv. Bact........ 12
Howell	Dressmaking..... 14	Sewing III....... 16	....	....
Jones	Sewing III.. 13	Sewing II........ 12	Sewing III........ 16	Sewing III........ 13
Paddock	Sewing I.......... 9	....	....	Sewing II 9
Rickman	Printing 6	Printing 5	Printing 4	....
Clure, Mrs	Calisthenics 17	Calisthenics...... 32	Calisthenics...... 18	....
McFarland	Bookkeeping..... 23	U. S. History..... 35	A Arithmetic.... 37	Bookkeeping..... 25
Holroyd	A Grammar 28	Algebra I......... 27	Algebra I......... 26	Algebra II........ 32
Noyes	....	....	....	Geography....... 14
Loomis	....	....	....	Composition...... 21
Reynolds	....	....	B Arithmetic..... 9	....
Dickens[3]	Horticulture I.... 47	Horticulture II... 12	....	....
Greene[3]	....	....	....	Hort. Industrial.. 2
Lund	Apprentices in Boiler and Engine Practice			

[1] First half term.
[2] Second half term.
[3] Experiment station work.
[4] Alternate days.

Morning Class Hours:
(Tu. Wed. Thur. Fri. Sat.)
1. From 9:05 to 9:50.
2. From 9:55 to 10:40.
3. From 10:45 to 11:30.
4. From 11:35 to 12:20.

NSTRUCTOR, SUBJECTS, AND NUMBER IN CLASS.

Fifth Hour.	Sixth Hour.	Seventh Hour.	Eighth Hour.
Object Drawing...Tu. & Th., 22			
Geometrical Drawing...F., 20			
Object Drawing...Tu. & Th., 23			
Freehand Drawing...W., 33			
Analytical Chemistry.....Tu. & Th.: Lab. W. & F., 45			
Analytical Chemistry.....W. & F.; Lab. Tu. & Th., 45			
Analytical Chemistry Laboratory...90		Chemistry of Metals Laboratory......Tu., W. & F., 48	
Agriculture...34			
Laboratory...2			
Electrical Measurement...W. & F., 4		Agricultural Physics...Sat., 8	
Oratory II...12			
Machine Design...Tu. & Th., 3			
Machine Design...W. & F., 20		Apprentice Drawing...F., 15	
Woodwork...Tu. & Th., 6			
Machine Shop...Tu & Th, 35		Machine Shop...Tu. & Th., 35	
Machine Shop...W. & F., 29		Machine Shop...W. & F., 29	
Blacksmithing...Tu. & Th., 21		Blacksmithing...Tu & Th., 20	
Blacksmithing...W. & F., 11		Blacksmithing...W. & F., 19	
Foundry...Tu. & Th., 12		Foundry...Tu. & Th., 10	
Foundry...W. & F., 9		Foundry...W. & F., 7	
Domestic Science III...W. & F., 22			
Demonstrations...Tu. & Th., 12			
Laboratory Assistant			
Bacteriology Laboratory.....W., 12; Th., 12; F., 12			
Dressmaking...W. & F., 14			
Sewing III & IV...Tu. & Th., 13			
Printing...19		Apprentices, 9 hours per day...2	
Calisthenics...35		Calisthenics, before chapel...40	
Horticulture Industrial.......Tu. & Th. 8; W. & F., 10		Horticulture Industrial...Monday, 5	

Afternoon Industrial Hours:
(Tu. Wed. Th. Fri.)

5. From 1:30 to 2:30.
6. From 2:35 to 3:35.
7. From 3:50 to 4:50.
8. From 4:55 to 5:55.

bell system. The court-house trees were spindling and sickly, and many of them will die within a year. The trees grown by the Campbell method are stocky, with thick trunks, and are growing vigorously. An orchard on high upland, about a mile from the Pomeroy farm, is being cultivated by the Campbell method and the trees are as thrifty as any in eastern Kansas. A number of shade trees receiving the Campbell method of cultivation growing in a yard in town near the court-house are stocky, with good trunks, and are thrifty, in strong contrast with those around the court-house that were watered but not cultivated.

The Kansas Experiment Station has been testing for several years the Campbell system of subsurface packing, and the results obtained on the College farm indicate that this method should be practiced in dry times on every farm in the State. A field adjoining the College farm had been in corn for thirty years or more until all the vegetable matter was burned out of the soil and it drifted badly with every high wind. One spring this field was plowed and harrowed in the usual way. A high wind came and the air was filled with soil all the way from this field to the main streets of Manhattan, a mile and a half away. The next year this field was plowed, the team stopped at 11 A. M. and packed with a subsurface packer the ground that had been plowed during the forenoon. At night the team stopped in time to pack what had been plowed in the afternoon. Just after the work of plowing the field was finished a wind blew at the rate of thirty-five miles an hour all one day, and no dust could be seen blowing from the field—the subsurface packing prevented it.

In the last four years we have never failed to get a stand of any kind of grass, alfalfa, clover, millet or wheat where the ground has been packed, while if dry we have failed with all these crops where the packer has not been used.

A farmer in Russell county puts in two to three hundred acres of wheat each year and has made it a rule to pack the ground as fast as plowed. All his neighbors insisted that this was a waste of time, and finally this farmer decided that as all his neighbors agreed they must be right and he stopped the packing, finishing up the rest of his land by plowing and harrowing in the usual way. The land that was not packed yielded thirteen bushels of wheat per acre; the land that was packed yielded thirty-three to forty bushels per acre.

The use of the subsurface packer is a great help in keeping land from blowing; it makes a good seed bed and is one of the best methods of conserving moisture. Mr. Campbell has used his methods on the Pomeroy farm but two seasons, and in this

Corn in adjoining field, by Campbell method.

Corn, under ordinary cultivation.

time has shown marked results. No experienced man expects to get land in the best condition short of five years, and yet he has secured good results in seventeen months on unusually unfavorable soil. We have tested his methods on the College farm, as far as our greater rainfall will permit, for six years. This work has convinced us that Mr. Campbell has solved the problem of

holding the moisture in the soil until the plant can use it, and Professor King has demonstrated that twelve inches of water used by the plant will develop maximum yields of any of our farm crops.

With the hot winds, corn cannot be made a sure crop in western Kansas by either irrigation or by the Campbell system. From the study of the Campbell system on the College farm and on the Pomeroy farm we believe that by its use a sufficient amount of moisture can be maintained in western Kansas in the soil to secure crops regularly of wheat, Kafir-corn, sorghum, cow-peas, soy beans, and alfalfa, and feeding experiments conducted for thirteen years at this Station show that with these crops beef, pork and milk of as good a quality can be produced at less cost than farther east. When its merits become generally known the Campbell system will be used throughout western Kansas, and when this time comes that section of the State will be one of the greatest feeding sections of the West. H. M. COTTRELL.

The editor and wife were in Manhattan the first of the week attending the annual meeting of the Kansas Editorial Association. A part of the program included a tour of inspection of the State Agricultural College. Over one thousand five hundred students are in attendance there. This educational institution is doing a grand and glorious work, but the Faculty is handicapped by the niggardly appropriations for its expenses. We venture the opinion that if our State legislature only knew the great amount of good that is being accomplished at this institution, they would be far more liberal in their appropriations for its needs — *Vermillion Times.*

The treatment and opportunity for observation and inspection given the editors at Manhattan last week not only made friends for the town and College, but satisfied them that President Nichols is the right man in the right place and has the right idea of managing the great institution of which he is the head.—*The Courtland Register.*

I hope Professor Nichols will teach his boys how to farm. I hope that the girls will learn how to farm and that their course will include educational substantials as well as domestic ones—baking, sewing and cooking, which it does.—*Brown County World.*

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.

Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

Professor Willard was on the sick list last week.

Prof. D. H. Otis attended a farmers' institute at Tonganoxie last week.

The Mechanical Department has commenced the building of a small vertical steam engine.

Prof. D. E. Lantz made a trip west along the Union Pacific railroad to make some prairie-dog investigations.

The Military Department had its regular house-cleaning last week. All the arms and accoutrements got a regulation "shine."

The building committee of the Board of Regent will be in session to-day to award the contract for the new addition to Library building.

Prof. F. A. Metcalf, formerly professor of oratory at this College, is now stationed at Baton Rouge, La., at the State University.

The Manhattan Horticultural Society will meet in Horticultural Hall, April 17, at 2:30 P. M. A good program has been provided and every one will be welcome.

The members of the baseball team have received their new uniforms. The suit is black, with large white letters in front, heralding the glorious K. S. A. C.

The chair of Miss Rupp, of the English Department, was admirably filled during her illness by Prof. W. H. Olin, who is taking a postgraduate course in agriculture.

Mrs. Otis, who has been absent from home for several months, visiting in Peoria, Ill., Berea, Ky., and Washington, D. C., returned this week, and the professor is happy.

W. A. McCullough, of the K. S. A. C., class of '98, graduated in the University Medical College at Kansas City, Mo., last week, and decided to locate at Linwood, Kan.—*Nationalist.*

Professor McKeever has received a copy of his new spelling-book, or Orthography, as he calls it. The book will be a competitor for adoption by the State text-book commission next month.

The Mechanical Department has just shipped a machine for building wire fence, to Brownell & Pohler, of Lawrence. The machine is their own invention and was built complete by the College machine shop.

Professor McKeever left on Saturday noon for a short visit with relatives at Enid, Okla.

Word has just been received that Mr. R. W. Clothier, formerly instructor here, has had another experience with a fire. The State Normal School building at Cape Gerardeau, Mo., was detroyed by fire and the work of the school is now done in a convent building, secured temporarily.

The sixth lecture of the lecture course was given last Saturday night in College chapel by Prof. John B. De Mott. His subject was "The Hays of the Senses," and he handled it in a masterly manner. The next and last lecture of the season will be given next Friday night by Leland T. Powers, the great American impersonator.

Dr. H. W. Wiley, chemist of the department of agriculture, has sent one hundred pounds of high grade sugar-beet seed to the Experiment Station for use in this State. The Station has not been distributing sugar-beet seed to isolated farmers growing small plats, but as long as this supply lasts will be glad to send seed to farmers growing one fourth to one half acre or to groups of not less than five farmers in a locality, in which case smaller plats may be grown. Address J. T. Willard, Manhattan, Kan.

The following is the roll of the College band, winter term: A. B. Brown, Director; R. H. Brown, Leader. E Flat Tuba—E. M. Amos, F. Pendelton, C. B. Swift. Slide Trombone—H. R. Martin, F. W. Wilson, A. J. Rhodes. B Flat Tenor—A. H. Albrecht, J. J. Beck, E. W. House, H. Judd, G. Skow, H. Spuhler, F. H. Walters, G. Wolfe. French Horn—O. H. Smith. E Flat Alto—A. B. Dubach, L. Fielding, H. Hess, H. Loomis, W. N. Posey, G. Souders, H. Ulrich. Cornets—R. H. Brown, F. Pleasant, H. Gardiner, G. Hutchinson, A. S. Johnson, H. Matthews, V. Matthews, G. L. Wright, G. E. Yerkes, C. Clark. Baritone—B. Jackson, C. Legere. Clarionet—A. D. Brown, G. Fockele, L. B. Bender, G. L. Bliss, E. E. Sprague, F. Woodruff. Piccolo—J. T. Wilson. Drums—C. M. Miller, R. R. Paine, P. Winnie, C. Withington. Total, 47 members.

The last number of the *Farmers Advocate* publishes a well-written five-column article on "The Agricultural College and the Invaluable Lessons it Imparts to Students." The article is too long to find room in the INDUSTRIALIST, but the introduction shows the drift of the discussion and reads as follows: "The State Agricultural College, at Manhattan, Kan., is doing much for the farmers of the State. With the beef demonstration held at the College Tuesday of last week ended a course of practical lessons in animal husbandry, during which the students were given the benefit of the experience gained by breeders and feeders of stock through many years. In many cases the three hundred sixty farm boys in the class of animal husbandry learned in half an hour what it would have cost them on the farm thousands of dollars and weary years of discouragement and failure."

President Nichols and Professors Mayo and Dickens were at the Fort Hays Experiment Station March 31 to make preliminary surveys for the work to be done there during the summer. There are at present eight men and thirty six horses on the ground plowing and clearing up. The fields will be sown to Macaroni wheat, barley, Kafir-corn, cane, and special varieties of Indian corn. A start will also be made in forest tree planting. Professor Willard visited the Station April 6, to start some experiments in soil moisture. The work is in charge of Supt. J.G. Haney, a former assistant of the Farm Department.

Hon. Euclid N. Cobb, of Cedar Hill dairy farm, Monmouth, Ill., writes to the Agricultural College: "I must congratulate your College, the Faculty and the State of Kansas on your fine body of students. I have visited many colleges and attended some, so speak from experience when I say I never met a more gentlemanly and ladylike lot of young people anywhere. I did not, in my three days' stay with you, see one rude act or any lack of courtesy among themselves or to the visitors. Kansas will, in a short time, profit by the mixing of these boys and girls among the people of all walks in life in the State. And since my visit I am quite proud of my six Kansas-born childern, being born in a State that can gather together such a fine-looking and fine-acting lot of young people as are to be found at your College."

The Kansas Editorial Association held its annual meeting this week at Manhattan, and a represenative of the *New Era* was present to enjoy this annual love-feast of the editorial fraternity. It was held at Manhattan so that a visit to the State Agricultural College could be made and become more familiar with this grand school that so eminently qualifies our young men and women for the practical duties and responsibilities of life. It keeps the student in touch with the chief source of all wealth—the farm, and with manual labor in all its branches, and dignifies labor in a way that no other college in the State does. The enrolment of students is over 1400, the largest college in the State, and second in the United States of its kind. Every branch of the industrial arts is taught there, and the student required to familiarize himself with some branch of the arts, which he may select. There is an agrico intellectual atmosphere about the College that thoroughly imbues the student with the dignity of agricultural and mechanical pursuits. There are the shops for the iron and wood works, the printing-office, the creamery, the chemistry building; the conservatory for propagating flowers, the growing of cereals, and grasses and trees; the barn with herds of cattle and hogs to experiment with—all combine to induce the student to engage in such a calling. And the girls are given equal inducements to become cultured and dignified helpers to the farmer and mechanic, or as a wife or wage earner. They are taught cooking, sewing, and every branch of housekeeping by modern methods, along with the other studies usually taught in colleges. It is a school that is a blending of the intellectual, social and mechanical, in such an harmonious way that is truly charming.—*Spring Hill New Era.*

ALUMNI AND FORMER STUDENTS.

Charles Campbell, '91, conducted the exercises in chapel one morning last week. He is now pastor of a church in Philadelphia.

M. W. Sanderson, '98, and Miss Myrtle Cole, student in 1900, were married Wednesday, April 2, at the residence of the bride's mother, near Wauneta, Kan. Mr. and Mrs. Sanderson took a short wedding trip, including a visit to the College. Their home will be in Marysville, Kan. They have the best wishes of their friends and classmates.

Miss Minnie Cowell, '88, expects to leave about the end of the month for her home, Steyning, Sussex, England. She attended the banquet of K. S. A. C. alumni held in Washington, April 2, and reports a delightful time. Miss Cowell is a trained nurse, and her occupation takes her about a good deal. She has spent several winters in Egypt.

An engagement of much interest is that of Miss Annie J. Hooley and the Rev. Irving Todd [fourth year 1878], a formal announcement of which has just been made. Miss Hooley as principal and the Rev. Mr. Todd as chaplain of the College of the Sisters of Bethany have a wide acquaintance throughout the State. Their marriage will take place this summer at the home of relatives of Miss Hooley, at Davenport, Ia.—*Topeka Herald.*

Floyd Howard [fourth year 1901] and Miss Marie Hjort [special student 1901] were married at the home of the bride's parents, northeast of town, on Wednesday, March 26, at 10 o'clock A. M., Reverend Guiler officiating. Only the immediate relatives and friends of the contracting parties were present. After partaking of a splendid dinner served for the occasion, the young people took the 1:14 train for Manhattan, where they will make their future home.—*Alta Vista Journal.*

Cecil Anderson [third year, 1901], who has done such excellent work on the local force of *The Mercury*, has purchased Leslie Smith's book-store, taking charge yesterday. He will add largely to the stock and make it up-to-date in book-store goods. Cecil knows nearly everybody who trades at Manhattan, and with his courteous treatment and careful attention to business matters will make new friends. *The Mercury* hopes for and believes that his business venture will be pleasant and profitable.—*Mercury.*

At the graduating exercises at the Chicago Veterinary College last week a beautiful and expensive gold medal was offered as a prize to the student showing the greatest proficiency in his studies. We are pleased to state that the prize fell to our esteemed citizen Dr. E. C. Joss ['96]. The course at Chicago embraces a three year's course, but Doctor Joss completed the course in two years, and as this article shows he improved the time and graduated at the head of his class numbering fifty-seven graduates. Doctor Joss seems to be well fitted for the profession which he has so well qualified himself for. The Doctor will open an office in Fairview and we predict for him a large and growing practice.—*Fairview Enterprise.*

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THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE
AGRICULTURAL COLLEGE

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Editor-in-Chief,	PRES. E. R. NICHOLS
Local Editor,	PROF. J. D. WALTERS
Alumni Editor,	PROF. J. T. WILLARD

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THE INDUSTRIALIST.

VOL. 28. MANHATTAN, KAN., APRIL 22, 1902. NO. 26

THE OMISSIONS OF THE CONSTITUTION.

THE days of excessive laudation of the constitution of the United States are probably about past. We have been almost laughed out of the "inspiration theory" of the constitution and some have been ready to go almost to the other extreme and pronounce ours the worst instead of the best government in existence. This, however, is not true of any but such as are over sensitive to foreign criticism, which may be the poorest kind of criticism after all. But however that may be, no doubt most people —people who count themselves intelligent and possessing a fair amount of general information about the nature of our government and the provisions of the constitution—are wholly unaware of some very important omissicns in the constitution of the United States. Some of these have to do with matters about which people not particularly concerned in the administration of the government would not be likely to think.

For instance, here is a possible emergency for which there seems to be no provision whatever. In article 2, section 1, clause 6, it is provided that "in case of the removal of the president from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the vice-president." There is no difficulty here in case the president is removed, either by impeachment, death or resignation. But on the question of inability to discharge the powers and duties of the office, who is to be the judge of that inability? The constitution makes no provision. If the president were actually insane, the fact of his insanity might be established in his case as in that of any other man. But this certainly would not of itself be a declaration of his inability to perform the duties of his office. If so, then it rests a very large power in an institution that was never intended to wield such power. In these days when conviction of insanity is easy, it would be comparatively easy for the courts to get rid of most any, to them, disagreeable

chief executive. But to pass this, and take another hypothetical case. Suppose it were not a case of insanity, but a mental or physical inability to perform the duties of the office of president, a disability of which the president himself was wholly or partially unconscious. Presidents as well as other persons are subject to sudden collapse, physical and mental, in which condition they are not conscious at all, or only in part, of their real unfitness to perform even the most unimportant duties of their position. It is not long since the country saw a distinguished statesman in just this condition, occupying one of the most important positions in the cabinet. It is easy to get rid of such a person when only a member of the cabinet, for it is a well-established principle that cabinet positions are at the command of the president. Had that same person been president of the United States, we might have had a very different experience. In that position he might have been far less docile, and quite unwilling to recognize his inability.

But of this class of omissions, the average man is not so apt to think. Indeed, in practice, it may not prove to be a very important omission. But there is a class of omissions some of which, perhaps, ought to concern us. To begin with, there is no provision in the constitution, as many suppose, securing to us the blessings of religious liberty. It seems strange the impression that our constitution secures religious liberty throughout the United States, should be so general and persistent. The first amendment says plainly: "Congress shall make no law respecting the establishment of religion, or prohibiting the free exercise thereof." The guaranty is against any law of congress only, and nothing whatever is said about the states either here or in any other part of this document. If Utah, for instance, wanted to establish the Mormon church and support it by taxation, the federal authorities would be wholly powerless to prevent it, even though this meant the reëstablishment of polygamy also.

Nor as yet can we say there is any guaranty in the federal constitution regarding free speech or freedom of the press, for this same amendment makes the prohibition apply only to congress. In the case of Presser *vs.* Illinois, it was held that no man could under the federal constitution claim the right to bear arms, if the state chose to deny him this privilege. In the case of Hurtado *vs.* California, the United States supreme court held that in-

dictment by grand jury was not required by the constitution in criminal cases, but that a court was justified in "proceeding by information, after examination and commitment by a magistrate, certifying to the probable guilt of the defendant." If trial by petit jury is secured to United States citizens and residents of the United States, it must be because of the first section of the fourteenth amendment, which provides that no state shall "deprive any person of life, liberty, or property, without due process of law." It was this clause, however, that was invoked in Hurtado *vs.* California, where it was claimed that by it trial by grand jury was guaranteed to everyone within the jurisdiction of the United States. Whether the court would hold that trial by the petit jury of the old common law—in which at least the number and unanimous verdict are essentials—is included in "due process," of course, it is impossible to say. It is possible that the court some day will retrace its steps in this matter and under the fourteenth amendment secure to us many liberties that are now entirely at the mercy of the state governments. There are certainly large possibilities wrapped up in the first section of this amendment if the courts are willing to construe it in anything like the liberal spirit they have applied to other portions of the constitution.

But, in conclusion, it ought to be said that by no possible construction can it be held that the constitution confers on anyone the right to vote. This is an impression that is quite as persistent as the one regarding freedom of religion just noted. It is, however, a little less inexcusable, especially when we remember that it is an opinion that is supported by the dictum of one of the associate justices of the United States supreme bench. In the Slaughter House Cases, Justice Miller, after quoting the fifteenth amendment, adds: "The negro having, by the fourteenth amendment, been declared to be a citizen of the United States, is thus made a voter in every state of the Union." Yet, all in the world the fifteenth amendment pretends to do is to prevent the disfranchisement of the negro on account of "race, color, or previous condition of servitude." He may, however, be legally disfranchised for other reasons.

C. E. GOODELL.

The tile floors of the vestibule of the new building will be furnished by Fernald, Martin & Co., of Topeka.

PRINTERS AND PRINTING.

YEARS ago printing was termed the "Art of arts preservative." How much more true now. Printing is indeed an art, and the modern printer an artist. But the greatest difficulty is that there are so many working at the trade and calling themselves printers who do not know the first principles of typography, to say nothing of the rest of the trade, that sometimes the trade is brought into disrepute. A young man—and occasionally a young lady—will make up his mind that he will learn the printer's trade, and makes application to some country newspaper editor for a position. Many times the editor knows nothing of the trade, and is dependent on his help. Ordinarily he does not pay enough to secure competent help, and the result is that the beginner is placed under the instruction of a thoroughly incompetent person. Ask the editor why he does not pay better wages and he will tell you he cannot afford to. If he would try paying living wages to a competent person he would soon find out that he could not afford to hire incompetent help at any price. Good printers are always in demand at good wages, and it is evident that they earn their salaries or they would not hold their jobs. Why is it that in an office that turns out nice, clean printing promptly; in an office where everything is ship-shape, clean, and in order, you always find steady, sober, bright and industrious employes? Because the editor realizes that, to secure the kind of help that will keep his office in proper shape and make money for him, he must pay wages necessary to secure such help.

Every person cannot make a successful printer of himself. A prominent educator of Kansas once said at a National Educational Association meeting: "Teachers are born, not made." This is true of printers. If one has not the natural tact and ability he had best keep away from a printing-office. To make a successful printer he must have this ability before he enters the composing-room, where he simply has these qualifications developed. He learns by practice to utilize his ability.

The "American Printer" says: "Experience proves that the apprentice foreshadows the workman, just as surely as the bend of the twig foretells the inclination of the tree. The upright, obedient, industrious lad will become a steady, skilful, and capable man, as unmistakably as the perverse, idling, careless boy will ripen into a lazy, dissolute, and worthless fellow. The fact is, a

boy is measurably the maker of his own destiny; and if he fails to acquire a master-knowledge of the trade to which he is put, it will mainly be because he did not at his outset determine to be a master-workman. Good morals and steady industry are indispensable. When a lad who possesses these qualities proposes to learn the art and mystery of printing, it should be inquired of him, Has he had a fair common-school education? Is he a perfect speller? Has he a turn for reading? Is his eyesight good? Is he under fifteen years of age? A true affirmative answer to all these queries will entitle him to the position of reading and errand-boy."

How many realize this when they enter a printing-office to begin their trade? Too many think printing a "snap" and would prefer to hold down a three- or four-dollar a-week job in a country printing-office than to get out on a farm at $20 per month and board or to shovel dirt on a section at $1.25 per day. Our advice is, that if after three or four years apprenticeship one cannot get more than $1 per day working at the trade he had better go to shoveling dirt. He probably never will make a success at the trade, and had better get out before he is starved out.

One of the most discouraging features in printing is the "Cheap John" printer. Oftentimes he will buy a small, worn-out office, probably discarded by some printer because it has served its usefulness, and "go into business on his own hook." He has never had a day's instruction under a competent workman, does not know the value of punctuation, is crude in his orthography and English, yet assumes the duties of compositor, proof-reader, make-up, and pressman. He will probably "wash up" his press once a month—if he can find time after doing an occasional job and telling what a wonderful workman he is—and his jobs always look blurred and muddy—like the ink had been put on with a trowel. He pays three or four dollars a month for an up-stairs back room for an office, pays no taxes, employs no help, never contributes to a public enterprise; and yet business men will patronize him because he will "do a job and take it out in trade."

But the printing business has a bright side to it. Scattered all over Kansas are hundreds of bright, newsy, clean newspapers, and the editors thereof are bright men, loyal citizens, employ competent help and pay for it, are public spirited, and in many cases the town could not get along without them. They pay taxes, are always willing to donate liberally to any public enter-

prise—and when the newspaper man uses the space in his paper to say a good word for his town, the merchants, the churches, the schools thereof, he is giving more to the public than the merchant who donates his few dollars to the same purpose.

In the larger towns are the larger printing-houses, where hundreds of men are earning good salaries. Most of these offices pay a minimum salary of $15 per week. The writer, while living in Topeka, had occasion to tabulate the number of persons employed at the trade there, and found that an average of four hundred seventy-seven persons were employed, at a yearly pay-roll of $317,775. One firm alone employed one hundred persons at an annual pay-roll of $90,000.

Modern printing with modern equipment is truly a work of art. *The Inland Printer* is a fair sample of perfect work. It is a magazine that no printer can afford to do without. It is filled with the finest illustrations imaginable, both in half-tones and chromotint, together with articles by some of the most noted modern printers of to-day. To read this book shows the ordinary printer how antiquated he is; yet if he will study it, and profit by so doing, he can keep pace with his more fortunate brother, at least as far as his opportunities will permit. The Inland Type Foundry, St. Louis, the most modern foundry in the world, issues the *Practical Printer* for twenty-five cents a year, and it is a little gem replete with articles by masters of the art.

One should understand before entering a printing-office as an apprentice that he should have some natural qualifications; that he cannot learn the trade in a year or two; that he never gets too old to learn; that if he expects to be an up-to-date printer he must be learning all the time. The writer realizes now, after twenty years at the trade, that he does not know one-half as much as he thought he knew after completing his first three years.

In a well-regulated office, where first-class printers are employed, you rarely see the employes bobbing around over the office on a trot, or trying to cover every inch of space in his "alley" while endeavoring to "set a stick in fifteen minutes" so he may consider himself a "swift." Such printers usually take about thirty minutes to tell how much they can set in an hour, and then take another half-hour to correct their work. The competent printer goes at his work more mechanically, makes every motion count, does not walk across the floor unnecessarily, does

not put his copy in type until he is sure that it makes sense, and above all things is never trying to carry on a conversation and work at the same time. When his stick is dumped it is ready for the make-up, and no time is lost in correcting inexcusable errors.

The "American Printer" says: "Correcting is the most disagreeable part of a compositor's business, diminishing as it does his earnings, and causing great fatigue, and, by leaning over the stone, endangering his health. A foul proof, however, is a fault without extenuation, and seems to deserve some punishment. The noise and confusion which prevail in badly governed printing-offices, from light and frivolous conversation, not only retard business, but distract the attention of the compositor from the subject he has in hand, and cause him to make many mistakes. Some men, no doubt, can support a conversation and at the same time compose correctly; but their noise confuses those who are unable to preserve accuracy except by close attention to their copy in silence."

J. D. Rickman.

Below is a copy of the letter sent out from the College creamery with the pay checks for March. It is worth while for every farmer who has cows to consider this proposition. The College creamery runs every day in the year except Sundays: "Dear Sir:—With this letter we hand you a check and statement and pay you twenty-four cents per pound for March butter fat. There is every indication that butter will remain high until grass comes. We want to increase our milk supply by that time to five thousand pounds per day. This increase will mean money in your pockets. In the inclosed check we pay you two cents less for butter fat than we get for butter. When we get a run of five thousand pounds per day we can pay within one-half cent of the price we receive for butter. For six thousand pounds of milk per day we can pay the same for butter fat as we get for butter. Our butter brings the highest market price in New York. These figures are based on that price, less freight and commission, which amounts to about three cents per pound. Will you help us reach this point? It means money to you. Talk milk to your neighbors and induce them to help you out and thereby do them a good turn. Test: Usually the lowest test period of the year is the two months before grass. The average test is two-tenths per cent lower this month than last. Records of the College herd show this falling off every year at this time. Any one dissatisfied with this test is urged to report to us at once and we will endeavor to make the matter clear to him."

PROGRAM KANSAS STATE MUSIC TEACHERS' ASSOCIATION,

Topeka, Kansas, Monday and Tuesday, April 28 and 29, 1902, at the First Congregational Church.

Temporary Organization.

President..Mr. Charles A. Boyle, Emporia
Secretary and Treasurer..Miss Anna M. P. Bundy, Topeka

EXECUTIVE COMMITTEE.

Mr. Charles A. Boyle, Emporia,
Mr. B. S. Hoagland, Hutchinson,
Miss Anna M. P. Bundy, Topeka.

LOCAL COMMITTEE.

Miss Anna M. P. Bundy, Topeka
Mrs. A. F. Horton, Topeka,
Mrs. G. P. Grimsley, Topeka.

PROGRAM COMMITTEE.

Mr. A. B. Brown, Manhattan, Mr. E. C. Marshall, Wichita,
Miss Mary A. Henderson, Leavenworth.

Monday, April 28,

4 p. m.

Address of Welcome..........................Rev. Charles M. Sheldon, D.D., Topeka
Response..Mr. B. S. Hoagland, Hutchinson
Address, "The Need of a Better Knowledge of Musical Composition," Mr. George B. Penny, Lawrence.

President's Address. Secretary's Report. Reports of Committees.

First Concert, 8 p. m.

Overture to Stradella—Flotow..Mr. W. F. Roehr
Summer—Chaminade..Mrs. Frank Thomas
Etude Caprice—Mills..Miss Sybil Harvey
"Honor and Arms" fr. Sampson—Handel..........................Mr. Ernest Gerald Council
Cossack Air "Fair Minka"—Cabel..Mrs. Sarah T. Brown
Song, (*a*. Scena—"O Santa Medaglia;" *b*. Aria—"Diorossente, Diodamor.") fr. Faust—Gounod
Mr. Vincent Graham.
Song; (*a*. In Autumn; *b*. Springtime)—Oscar Weil..........................Miss Vida Wood
Violin Obbligato, Mr. Frank Carruth.
Piano, (*a*. Au Den Fruhling—Grieg; *b*. Etude—Jensen)..........................Miss Grace Collins
Ombra Leggiera (Shadow song fr. Dinora)—Meyerbeer..........Miss Susan Mermel Davidson
Violin Solo, Concerto Militaire—Papini..........................Miss Lu Celia B. Clark
Song, (*a*. Poppies—DeKoven; *b*. A Memory—James Philp)..........................Mr. David Bowie
Estudiantina—La Comb..........................Mrs. Thomas, Mrs. Dickie, Mrs. Foster, Mrs. Ferry
Organ, (*a*. Selected; *b*. Selected)..Mr. Geo. B. Penny
At the close of the concert there will be a general social time given by the teachers for the purpose of better acquaintance.

Tuesday, April 29.

9 a. m.

Round-table for Teachers of Voice..........................Mr. E. C. Marshall, Wichita, chairman
Remarks by the Chairman.
The Value of Physical Development in Singing..........................Mrs. G. P. Grimsley, Topeka
Discussion, Mrs. R. L. Jones, Emporia; Mrs. E. S. Slocum, Lakin; Miss M. L. Legler, Leavenworth

10 a. m.

Round-table for Teachers of Piano.................Miss Gertrude H. Hale, Winfield, chairman
Remarks by the Chairman.
Piano Technique...... ....Mrs. A. M. Reynolds, Lyons
Discussion, Mrs. A. F. Horton, Topeka; Miss L. M. Helder, Manhattan; Miss M. A. Henderson, Leavenworth.

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10 a.m.

Round-table for Teachers of Music in Public Schools, Miss Jessie L. Clark, Wichita, chairman
Remarks by the Chairman.
Something about High-school Music....... ....Miss Jessie L. Clark
Discussion, Mr. A. B. Brown, Manhattan; Miss Irene Wharton, Independence; Miss Lucia A. Wyatt, Topeka.

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11 a.m.

PIANO RECITAL—MR. SIGFRID LAURIN, LINDSBORG.

Etudes Symphonie.......... ....Schumann
Ballade op. 24............... ....Grieg
Parsifal.........................Liszt
a. Ballade op. 38; *b.* Scherzo op. 31; *c.* Polonaise Fantasie op. 61.........Chopin

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2 p.m.

MUSICAL-LECTURE RECITAL—MISS O. AGNES LAPHAM, CHANUTE.

Prelude and organ Fugue, A minor.............. ... .Bach-Liszt
Scherzo, Funeral March op. 26.......................Beethoven
a. Impromptu, F sharp major; *b.* Etude op. 25, No. 3; *c.* Etude op. 25, No. 9. ....Chopin
Spinning Wheel.......................Chaminade
Ungeduld (Impatience).............. ....Moskowski
Florence Waltz.................... ....Liebling

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3 p.m.

Round-table for Teachers of Music in Public Schools, Mr. B. S. Hoagland, Hutchinson, chairman
Remarks by the Chairman.
Charts and General Helps in the School Room ....Mr. H. W. Jones, Topeka
Discussion.................. .. ....Mrs. Gaston Boyd, Newton; Mrs. J. A. Kleinhaus, Topeka

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4 p.m.

RECITAL OF COMPOSITIONS BY KANSAS COMPOSERS.

Grand Fantaisie Symphonie, "Excelsior!"—Laurin.... ....Mr. Sigfrid Laurin, Lindsborg
"Out of the depths have I cried unto thee, O, Lord." (Ps. 130 : 1.)

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5 p.m.

Business Meeting. Election of Officers.

Second Concert, 8 p. m.

Organ, Selected.................Mrs. Flora Bate Kenney, Emporia
Voice, "A May Morning,"—L. Denza.................Mrs. E. S. Slocum, Lakin
Harp, "L' Echo del Opera"—Oberthur.......................Mrs. Cora E. Brown, Manhattan
Voice, "Italian Aria"—Proch........... ....Miss Metta K. Legler, Leavenworth
Violin, "Fantasia Ballet" op. 100—DeBeriot...................Mr. R. H. Brown, Manhattan
Voice, "Salve Regina"—C. Henshaw Dana...................Miss Lucia A. Wyatt, Topeka
Piano, "Sonata in C sharp minor" op. 33—Preyer.................Mr. Carl A. Preyer, Lawrence
Piano, "Concerto in A minor"—Schumann...................Miss Eleanor E. Harris, Manhattan
With orchestration accompaniment on second piano, Mr. R. H. Brown, Manhattan.
Violin, "Romantique Concerto" op. 35—Godard.....Mrs. J. Abbie Clark-Hogan, Junction City
Piano (*a.* Renouveau—B. Godard; *b.* Valse in D flat—Wieniawski), Miss Lorena M. Helder, Manhattan.
Voice, "Ave Maria"—Luzzi............ ... .Mrs Gaston Boyd, Newton
Piano, "Faust Waltz"—Gounod, Liszt.....................Miss O. Agnes Lapham, Chanute
Voice, "Hear Ye Israel," aria fr. "Elijah"—Mendelssohn...... .Mrs. J. A. Kleinhaus, Topeka
Piano, (*a.* Rhapsodie Hongroise—Liszt; *b.* Nocturne op. 27, No. 1; *c.* Polonaise op. 53—Chopin
Mr. Sigfrid Laurin, Lindsborg.

FIRST REPORT ON COW TEST EXPERIMENT.

THE nine cows selected by nine successful Kansas dairymen and judged by Maj. Henry E. Alvord, of the United States department of agriculture, Prof. A. L. Haecker, of the Nebraska University, and Mr. T. A. Borman, of Kansas, at the meeting of the State Dairy Association, have completed their first month's record, as follows:

RECORD FOR MARCH, 1902.

Name of Cow.	Selected by.	Fresh.	Yield.			Feed consumed.				Judges' rank for profit.
			Milk, pounds....	Test, per cent...	Butter fat, pounds........	Grain: Bran........	Roughness: Alfalfa....	Roughness: Kafir-corn stover ..	Roughness: Total.	
Cowslip...............	J. W. Bigger......	Nov. 3,'01	761.6	4.45	33.89	222.5	893	171	1064	3
Haster................	E C. Cowles......	Dec. 10,'01	849.5	3.80	32.28	248.0	893	171	1064	1
Rose of Cunningham..	J. W. Cunningham	Jan. 28,'02	1200.1	3.00	36.00	222.5	893	171	1064	2
Clover Leaf..........	M. L. Dickson......	Jan. 12,'02	733.1	2.95	21.62	219.0	893	171	1064	7
Molly..................	A. H. Diehl........	Jan. 20,'02	824.0	3.15	25.95	211.5	893	171	1064	5
Rose of Industry.....	C. Elssaser.........	Jan. 15,'02	802.3	3.15	25.27	211.5	893	171	1064	8
Daisy Bell.	S. A. Johnson......	April, '02	....	.....	....	......	893	171	1064	9
Floss..................	C. C. Lewis........	Oct'br, '02	503.6	5.10	25.68	198.5	893	171	1064	6
May Queen..	G. W. Priest.......	Dec. 25,'01	630.3	4.90	30.88	222.5	893	171	1064	4

The roughness consumed is the same for each cow. Alfalfa hay was fed in the barn at night and alfalfa hay and Kafir-corn stover in a rack in the yard during the day. The grain was fed to correspond as nearly as possible to the individual needs of each cow. As these cows varied considerably in the test and also in individuality, it was difficult to gauge the amount of grain to correspond exactly with the amount of butter fat produced by each cow. Some changes in the grain ration, based upon the March record, will be made for the following month.

D. H. OTIS.

The Normal share of the Fort Hays reservation is being marked with stone monuments to show where the section-line roads should go. This is done to prevent the plowing of the sod there by persons who have leased land for cultivation.—*Normal Bulletin.*

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.
Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS.........Local Editor
PROF. J. T. WILLARD.........Alumni Editor

LOCAL NOTES.

Commencement this year will be on Thursday, June 19.

The K. S. A. C. ball team opened their season most auspiciously by winning their first game last Monday afternoon of last week, from Junction City, by a score of 7 to 5.

The impersonations given by Leland Powers, in College chapel last Friday night, were well attended and well received. The lecture was the last number of the College lecture course.

Prof. L. W. Hartman, of the Department of Physics, has been elected to a fellowship in physics in the State University of Pennsylvania and will go there next year to take advanced work.

The duties of Doctor Mayo as the State veterinarian seem to increase from month to month. Week before last he made a trip to Ness county to inspect live stock and last week he went to Sedgwick county on a similar tour of inspection. Shortage of feed this spring has its influence on the sanitary conditions of live stock.

The baseball game between the K. S. A. C. nine and the team of Lindsborg College, at Lindsborg, resulted in a wrangle. The game of our team and the Junction City nine was won by the College boys. To-day will be played a game with the Ottawa University boys. This will be the first regular College game on the home grounds, and as Ottawa has a strong team this should prove one of the best games of the season.

The new building is rapidly assuming its completed appearance. The work of slating is nearly finished, the plasterers have brown coated several rooms, the window-sashes are glazed and painted, most of the sub floors are laid, and the bricklayers are paving the plenum. Much of the radiator material is on the ground and the contractors of the heating apparatus write from Lawrence that they will be here to erect the electric fan some time time next week. The stairs will be built by the well-known firm of Horn & Co., Topeka.

Mr. F. C. Weber, assistant chemist of the Experiment Station, was taken ill with erysipelas Sunday, April 13. By the end of the week the disease had spread from his neck, where it started, over his face and chest. On Friday afternoon Doctors Little and Roberts held a consultation and telegraphed his uncle, Professor Weber, of the Ohio State University, that he was seriously ill, but improving. On Saturday he still had fever and delirium. He is at his room at Doctor Little's home and is taken care of by postgraduate students and other friends.

Regents McDowell, Satterthwaite and Nichols met here Tuesday afternoon as a special committee of the Board to open the bids for the addition to Library Hall. There were but three bids, and the contract was awarded to Herman Schubert, of Manhattan, for $9955. The building is to be finished by September 1. The contract does not include the heating and lighting apparatus. Mr. Schubert has had considerable experience in building, having been foreman of construction for Ulrich Bros. and for C. P. Dewey for several years. He is a first-class carpenter himself and will undoubtedly construct a good building for the College.

Prof. H. M. Cottrell, who has been at the head of the Agricultural Department of this College since July, '97, has resigned his chair and leaves the College to take charge as manager of Mr. Walter Vrooman's two-thousand-acre farm at Trenton, Mo. The field and live-stock work of the College farm were turned over Tuesday to Prof. D. H. Otis and the farm classes to Assistant E. H. Webster. Professor Cottrell will remain with us until July 1 in order to work up into bulletins the experimental data now completed by the Farm Department. This work will be covered by five bulletins, as follows: "Quality in Beef," "Baby Beef." "Fattening Steers Without Hogs," "Spontaneous Combustion of Alfalfa," and "Growing Alfalfa in Kansas." Mr. Vrooman's farm includes fifteen hundred acres of rich river bottom and five hundred acres of fine upland. The work of the farm will include feeding steers and hogs on a large scale; breeding and raising of farm seeds, especially corn; sanitary dairying; the production of broilers, capons, and eggs, and the growing of fruits and vegetables for city markets and for canning. Mr. Vrooman is at the head of the Western Coöperative Association, of Kansas City. This association has already in operation thirty stores in Kansas City, St. Joseph, Trenton, and other cities, and expects to establish stores on the coöperative plan in every city in the United States. The association has in operation a wooden-ware factory and a canning factory, and is installing a plant to manufacture drugs and grocery supplies. Mr. John Doggett, the great Kansas City merchant, has charge of the mercantile branch of the establishment. It is planned to purchase a chain of farms through the United States as fast as stores are established, the farms to furnish the farm supplies needed by the stores and factories. Professor Cottrell will have charge of these farms. The enterprise is backed by a large amount of capital, several million dollars having already been subscribed by responsible parties. Professor Cottrell is a man of practical as well as scientific attainments, and a man of energy and enthusiasm. His efforts at this College in establishing the dairy course and a short course in agriculture, his work in building up the strong agricultural course, his labors for the extension of the farmers' institute, and his missionary efforts in extending the growing of drought-resisting crops, have given him an enviable reputation all over the West. The chair of agriculture at this College is a difficult one to fill and the College realizes the difficulty of finding a worthy successor.

ALUMNI AND FORMER STUDENTS.

Announcement is made of the marriage of C. A. Kimball, '93, and Miss Matie Toothaker, second-year student in 1889.

The *Herald* announces that Geo. W. Finley, '96, has been elected assistant in mathematics in the normal school at Alva, Okla.

E. P. Hanna, assistant to the judge-advocate general of the navy, whose name became well known in connection with the Admiral Schley case in Washington, was a student at this College in 1872.

The INDUSTRIALIST has received the announcement that I. Archie Robertson, '96, was married April 9 to Miss Mercy Jane White, at Garnett, Kan. The young couple will reside at Lexington, Mo.

Mark Wheeler, '97, first lieutenant Fourth Infantry, was a distinguished visitor at the College several days last week. Lieutenant Wheeler is now stationed at Fort Clark, Tex., after serving three years in the Philippines. He enjoyed the renewal of old acquaintances and the visit with his brother and sister very much, a pleasure fully reciprocated by those whom he met.

Married, at the home of Capt. J. T. Smith, Mr. Chas. Ziegenhirt and Miss Margaret Welter [second year 1901]. April 9, Captain Smith performing the ceremony. Mr. Ziegenhirt is a prosperous and industrious young farmer. Miss Welter is well and favorably known in Manhattan and the College. After a few days' visit with home folks they departed for their future home at Linn, Kan.—*Nationalist.*

The State board in charge of penal and charitable institutions decided at their last meeting to institute a department for domestic science training in the Industrial School at Beloit, and have asked Miss Gertrude Coburn, of Kansas City, Kan., to take charge of and conduct the same.—*Capital.*

Miss Coburn is a member of the class of 1891, and having conducted with conspicuous success the teaching of domestic science at the Stout Manual Training School, Menominee, Wis., and later that of the Iowa State College, will undoubtedly administer her new trust successfully. Her friends are glad to know that she has recovered her health to such an extent as to be able to renew her work.

THE WASHINGTON ALUMNI ASSOCIATION.

March 7, 1902, the resident alumni of K. S. A. C. in Washington met at the home of M. A. Carleton to complete an organization. The name adopted was "The Washington Alumni Association of the Kansas State Agricultural College." After adopting a constitution and by-laws, the following officers were elected: President, L. W. Call; first vice-president, M. A. Carleton; second vice-president, Julia R. Pearce; secretary, Mrs. Gertrude Havens-Norton; treasurer, C. F. Doane. At the close of this meeting it was decided to call a meeting of all persons in Washington who

had in any way been connected with the College, at the home of W. L. Hall, for the purpose of making plans for a banquet to be given this spring.

As a result of this meeting thirty-four K. S. A. C. people gathered in the parlor and banqueting hall at Freund's, April 2, to do honor to our Alma Mater. W. R. Spilman, as chairman of the program committee, and G. F. Thompson, as chairman of the table committee, had excelled themselves in the excellent preparations, and the menu and program were a pleasure to all. As the last course was removed, W. R. Spilman, acting as toast-master, made a few interesting introductory remarks and then introduced Mr. E. P. Hanna, who gave some very interesting and amusing reminiscences of the old, old times at the College. C. F. Doane then responded to a toast, "Our Alma Mater as She Was." Other toasts were: "Our Alma Mater as She Is," Mrs. Gertrude Havens-Norton; "Our Alma Mater as She Will Be," G. F. Thompson; "The Faculty," A. S. Hitchcock; "President Fairchild," J. B. S. Norton. Following this M. A. Carleton proposed we drink in silence to the loved memory of the President most of us had known. This silent, simple tribute was fitting for one who was so unostentatious, and as pure as the water used. The other toasts were: "Kansas," L. W. Call; "The Ladies," W. L. Hall; "The Gentlemen," Miss Anna Hall; "Are College Days Over?" C. P. Hartley; "Possibilities of the Washington Alumni Association of the K. S. A. C.," M. A. Carleton.

During the program very interesting letters were read from Mrs. Kedzie-Jones, O. E. Olin, J. D. Walters, and H. C. Rushmore, president of the Alumni Association.

Those present were: W. R. Spilman, former student, Mrs. Bertha Winchip-Spilman, '91, M. A. Carleton, '87, Mrs. Carleton, L. W. Call, '83, Mr. and Mrs. J. B. S. Norton, '96, Jesse B. Norton, '97, Mr. and Mrs. C. F. Doane, '96, W. L. Hall, '98, Mrs. Gertrude Lyman-Hall, '97, Mrs. Mary Lyman-Otis, '94, Miss Anna Hall, student in '93, G. F. Thompson, student in '82 and superintendent of printing, Mrs. Thompson, Miss Nellie Thompson, N. G. Balterston, student in '97, Mrs. Balterston, H. E. Van Deman, professor of horticulture in '78-'79, C. P. Hartley, '92, E. C. Butterfield, '98, D. B. Swingle, '00, Mrs. H. A. Lyon, a student in '86, Miss Minnie Cowell, '88, A. S. Hitchcock, professor of botany '92-'01, Mrs. Hitchcock, E. P. Hanna, student in '72, W. C. Lee, student in '84 and secretary in the executive office in '97-'99, Daniel Pfeiffer, student in '87, C. S. Davis, superintendent of printing in '97-'99, W. O. Lyon, '93, and Miss Gertrude Ganzenbach. Other members of the Washington Alumni Association unable to be present were Julia R. Pearce, '90, Z. L. Bliss, '00, and Chas. Scott, '01.

Gov. W. E. Stanley has issued commissions to the following as cadet officers of the College battalion: Captain, Roger B. Mullen, St. Joseph, Mo.; first lieutenants, Orin P. Drake, Frankfort, and Alfred Sanderson, Reedsville; second lieutenants, DeVerne Corbin, Oxford, and Albert M. Nash, Burlington, Ia.

Volume 28. Number 27.

THE INDUSTRIALIST

Historical Society

ISSUED WEEKLY BY

KANSAS STATE
AGRICULTURAL COLLEGE

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EDITOR-IN-CHIEF,	PRES. E. R. NICHOLS
LOCAL EDITOR,	PROF. J. D. WALTERS
ALUMNI EDITOR,	PROF. J. T. WILLARD

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THE INDUSTRIALIST.

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SPONTANEOUS COMBUSTION OF ALFALFA.

(Advance sheet of Bulletin No. 110, from Farm Department.)

THERE were many instances during the summer of 1901 of alfalfa hay becoming so hot that it took fire by spontaneous combustion and was destroyed. Six examples will give an idea of the conditions under which spontaneous combustion took place.

O. L. Hull, Manhattan, Kan., cut a hundred acres of alfalfa, beginning the cutting May 19, when the first bloom appeared. The alfalfa was on river bottom-land and had made a heavy growth. The cut alfalfa was left in the swath about three days, when it was put in windrows with a side delivery rake. It was left for about three days on an average in the windrows, when it was gathered by a hay loader and stacked. The alfalfa was so heavy that the tops of the windrows got too dry and the leaves shattered considerably while the bottoms of the windrows were too green to be in good condition for stacking. The entire first cutting from the hundred acres was put in one stack and estimated to be one hundred fifty tons. The stack settled more than usual and became very hot, but was not thought to be sufficiently hot to be in danger. July 9, fourteen loads of alfalfa hay from the second cutting from the same field were placed on the stack to fill out where it had settled. This made a hundred sixty-four tons of hay in the stack. At 1 A. M., July 10, fifty-two days after the first cutting was made, a neighbor noticed a small fire on the stack that appeared like a locomotive headlight. An alarm was immediately given, but in a few minutes the entire outside of the stack was in flames and all the one hundred sixty-four tons were burned.

Emmett McDonald, Manhattan, Kan., made his first cutting of alfalfa the last week in May. The growth of alfalfa was rank and it was cut when the first blooms appeared. Cutting began Friday, the cut alfalfa was raked into windrows Saturday with a side delivery rake, where it stayed until Tuesday, when stacking

began. The hay was taken from the windrows with a hay loader and twenty-five to thirty tons put in a stack. The hay was so dry that the leaves shattered off considerably, and at the time of stacking it was considered that the stems were also well cured. Early in July it was noticed than the hay was quite hot, and the stacks were examined frequently. Mr. McDonald reports that the alfalfa took "spells" of being hot. It would be quite hot for about a week, then cooler for a few days, and then hot again. On the morning of July 25 one stack was so hot that it was thought unsafe to leave it longer, as other stacks stood near it, and work was started to tear the stack down and take it away. After a few feet were taken from the top of the stack the hay was found to be dry and charred and so hot that water hissed when thrown on it. The stems held their shape, but were apparently thoroughly charred. The exposed hay was too hot to handle, and it was well wet down and left to see what would follow. In about three hours a blaze broke out of the side of the stack, about four feet from the ground, and the stack was consumed. Another stack from the same cutting did not burn, but the interior of the stack was found to be well charred.

J. L. McCormick, Zeandale, Kan., had alfalfa hay on rich bottom-land. It made a rank growth and was cut late in May, when the first blooms appeared. It laid in the swath about one and a half days, when it was put in windrows with a side delivery rake. After curing in the windrow one to two days the alfalfa was gathered on wagons with a hay loader and placed in the stack with a stacker. The stack was built thirty feet wide, thirty feet high, and of sufficient length to hold one hundred fifty tons. Two months and a half after stacking, the fire broke out. The stack settled badly in the middle, and two or three weeks before the fire broke out several loads from the second cutting of alfalfa were placed on the top of the stack to fill out where the settling had taken place. At that time the stack was quite hot and the smell of heating alfalfa was strong, but no danger was anticipated. The hay kept getting hotter, and it was decided to take the stack down and save as much of the hay as possible. One end was taken off safely. After the top of the stack near the middle had been taken off for several feet the hay was so hot that men could no longer stay on the stack. A few minutes afterward smoke burst out at the ground, all along the stack. Men cut two

feet into the side of the stack and a blaze started. This was kept smothered with water until fifty tons of the hay had been taken away, when the fire could no longer be controlled, and what hay remained was burned.

George Washington, Manhattan, Kan., had a rank growth of alfalfa. It was cut early in June, when half in bloom, and burned in August. The cut alfalfa laid in the swath from one to one and a half days, when it was gathered in windrows with a side delivery rake. It was allowed to remain in the swath until apparently well cured, when it was stacked, one hundred fifty tons being put in a stack. The stack settled badly in the middle and smelled hot for quite awhile before it burned. Two or three days before the fire broke out a boy went on top of the stack where it had settled the most and taking a pole started to force it down through the center of the stack. The pole went through two or three feet of hay and then dropped down, the entire center of the stack apparently being burned out. Fire broke out all along the top of the stack, and no hay was saved.

W. D. Pool, Briggs, Kan., cut alfalfa May 20, when about one-fifth had come in bloom. The alfalfa was on bottom-land and had made a rank growth. It was left in the swath half a day, gathered in windrows with a side delivery rake, left in the windrows two days, loaded on wagons with a hay loader and unloaded with a horse fork. Twenty tons were put in the stack. June 25 the second crop was cut and six tons put on top of the stack. Early in July it was noticed that the stack was heating badly. August 2 the stack became so hot that fire burst out, and it was entirely burned. It began to burn about one o'clock in the afternoon.

T. W. Andrews, Rossville, Kan., had alfalfa on river bottom-land, where it made a very rank growth. It was cut the latter part of May, just as it was coming in bloom. It was put in windrows with a side delivery rake and left in the swath until considered well cured. It was put on wagons with a hay loader and taken from the wagons to the mow with a horse fork. Two hundred fifty tons of alfalfa hay were stacked in a hay shed, the sides of the shed being boarded down from the roof for a distance of four feet. In the north end of the shed there was one bent filled with the previous year's cutting of alfalfa. The storing of the new crop was begun next to the old hay. July 24 a load of alfalfa was taken out of the south end of the shed. The men had finished

loading, but had not yet driven from the shed, when smoke burst out along the line where the new alfalfa hay joined the old. In a few minutes a blaze followed and the shed and all the hay it contained were destroyed. For a week or more before the blaze broke out, the smell of heating alfalfa was strong. Mr. Andrews is not certain that the fire was caused by spontaneous combustion, but all the facts in the case indicate that it was.

CONDITIONS FOR SPONTANEOUS COMBUSTION.—All cases of spontaneous combustion of alfalfa hay that have come to our notice have occurred with the first cutting. Early spring growth of alfalfa in an ordinary season is rank. The alfalfa is cut either in May or early June, and at this time of the year the weather is such that it is difficult to thoroughly cure the alfalfa without getting it wet. Usually there is considerable damp weather and little wind after the first cutting is put in the mow or stack, and this hinders further drying. With later cuttings the growth is not so rank and succulent, and the weather is dryer and there is often wind. This makes curing easy.

At this Station we have not had alfalfa heat sufficiently to take fire, but we have had it become so hot that as a matter of safety we took it out of the barn several weeks after putting it in the mow and stacked it out-of-doors. We have had so much trouble with the first crop heating that for the past four years we have stacked it out-of-doors and put the other cuttings in the barn. We have cured the first cutting as carefully as we knew how, keeping it several days in cocks, putting covers on the cocks at night and opening the cocks during the day-time, and with all these precautions if there came a week or more of wet, "muggy" weather in July or August the alfalfa hay would become hot. If the weather stayed dry no heating took place. The College barn is of stone, and is well ventilated at the roof above the mows. In all cases of spontaneous combustion given in this bulletin the alfalfa was handled as little as possible and was turned but little. This resulted in the leaves becoming dry while the stalks contained considerable moisture. Where weather conditions were favorable this moisture in the stems was sufficient to promote fermentation, and in the cases given the fermentation generated sufficient heat to start a fire. Usually alfalfa will not get hot enough to do this, and the heating causes little damage. It is quite common to find alfalfa hay from the first cutting that is

brown or black from heating, and the cattle eat it with relish.

WHEN TO CUT ALFALFA.—Alfalfa should be cut when not more than one-tenth of the plants have come in bloom. Cut at this early stage, the yield of hay for the season will be much greater than if the alfalfa is cut near maturity, and every pound of hay secured will be worth more for feed.

At the Kansas Experiment Station, a strip through a field of alfalfa was cut when one-tenth was in bloom; another strip was cut after full bloom had passed. The strip cut early was nearly ready to cut the second time when that cut after full bloom was being harvested the first time. The strip cut early grew vigorously through the season and made three cuttings and a good aftermath. The strip cut after full bloom gave a low yield the first cutting and did not grow sufficiently to yield a good second cutting. Early cutting invigorates the plant.

The late cutting of the first crop injures the plant more than at any other time, and we have found it profitable to cut alfalfa the first time as soon as one-tenth was in bloom, even though the weather was bad and we knew that the crop would spoil in curing. The increased yield from succeeding cuttings over that cut late much more than makes up for the loss of the first crop.

HOW TO CURE ALFALFA.—The leaves of the alfalfa contain more than three times as much protein as the stems, a ton of alfalfa leaves containing as much protein as twenty-eight hundred pounds of bran. Protein is the material in feed necessary for the formation of blood, lean meat, and milk. Every effort, then, should be made to cure alfalfa in such a way as to save all the leaves possible. The method of curing will vary with the conditions of the crop, ground, and weather. When alfalfa has made a slow growth, and at the time of cutting the ground and the weather are dry, there is no difficulty in curing. Often under these conditions it is safe to rake within a few hours after mowing, and stack a few hours after the alfalfa has been put in the windrows.

When alfalfa has made a rapid growth and is rank and succulent, and the weather and ground are damp, the problem of curing is a difficult one. It is easy to dry the leaves, but the stems will contain much moisture after the leaves are too dry. Alfalfa hay should become so dry before stacking that when a handful of

stems are tightly twisted together no water can be squeezed out. The most practical way to accomplish this and at the same time save the leaves is the plan to adopt, and this will vary with different seasons and places.

There is practically no difficulty in curing any but the first crop. When the conditions for curing the first crop are unfavorable, we have usually found the most practicable method to be to cut the alfalfa in the morning after the dew is off, allow it to barely wilt in the swath, then rake, and before night put in narrow, tall cocks. After the dew is off the next morning and the surface of the ground has become dry we open these cocks carefully so as not to shatter off the leaves. If the weather is favorable, the hay may be stacked in the afternoon. If not, we re-cock carefully and repeat treatment until the hay is properly cured.

Some alfalfa growers, in stacking the first cutting of alfalfa, put alfalfa and dry straw or prairie hay in alternate layers. This is a satisfactory way if the dry material is available. Other alfalfa growers use ten to fifteen pounds of salt or air-slacked lime for each ton of hay, sprinkling the salt or lime so as to cover as much of each load as possible. Experiments made at this Station indicate that considerably less gains are made by cattle when salt is mixed with the feed. A trial of lime on alfalfa made at this Station showed little effect.

From all the experience that we have gained to date, we advise that the best way to prevent spontaneous combustion of alfalfa is to thoroughly cure before stacking. It is not often that all the conditions necessary to produce spontaneous combustion are present, and ordinarily there is no danger where reasonable care is taken, except with the first cutting, and with this cutting only when the growth is rank.

H. M. COTTRELL.

Major H. G. Cavanaugh, at one time military instructor at our Agricultural College and well known in Manhattan, has made application for re-instatement in the army. Major Cavanaugh was captain of a company that took part in the battle at Santiago during our war with Spain, where he was seriously wounded. He was promoted to major and retired because his wounds were supposed to be fatal. However, he claims to have fully recovered and asks reinstatement, which will probably be done by act of Congress.—*Mercury*.

ANALYSES OF CORN WITH REFERENCE TO ITS IMPROVEMENT.

BULLETIN No. 107, with the above title, has just been received from the State printer. It is a pamphlet of forty-four pages containing an account of the chemical work, in connection with the efforts of the Experiment Station, to improve corn in respect to its content of nitrogen. The following is a summary of the bulletin:

Corn is deficient in protein, and in 1898 experiments were begun, which are still in progress, having for their object the origination of varieties that should be richer in protein. Thirty-three varieties were analyzed, and these showed percentages of nitrogen ranging from 1.56 to 2.26. Analyses of single ears of two varieties showed great differences in the nitrogen content of different ears of the same variety, the percentages ranging from 1.53 to 2.24 in a variety that has been grown for thirty years on the same farm without admixture, and from 1.35 to 2.22 in a cross originated the year previous. Analyses of single kernels from the same ear showed considerable differences in nitrogen content, though not as great as among different ears of the same variety.

Analyses of a large number of single kernels, the specific gravity of which had been determined, showed that, while there seems to be a tendency toward higher nitrogen content with lower specific gravity, there is no uniform connection between these factors, and therefore corn richer in nitrogen cannot be separated from that poorer in nitrogen by means of specific gravity.

From the original thirty-three varieties twenty-one were selected, and used in making crosses by the Botanical Department. Each ear saved was pollenized by hand, and all other fertilization prevented. The crosses originated in 1898 in this way were planted in 1899, and each close-fertilized. The ears obtained that year were analyzed, and the next season those showing two per cent or more of nitrogen were planted, as a rule. These were again close-fertilized, the crop of each analyzed, and the same ones, in general, planted in 1901. They were again close-fertilized, and the ears produced analyzed. These crosses show remarkably high percentage of nitrogen in many cases, and all contain two per cent or more of nitrogen as the average for three years. In twelve cases the average is above 2.40 per cent of nitrogen, or fifteen per cent of protein.

The unsatisfactory outcome of a coöperative experiment is detailed, and analyses are given of a number of varieties of corn offered on the market, which shows how inferior the seed-corn now available is in nitrogen content. The selection of seed-corn richer in nitrogen, by choosing ears in which examination shows that the kernel possess relatively large germs, is strongly urged upon farmers as a practicable method of increasing the percentage of both protein and fat in corn. J. T. WILLARD.

ALUMNI TRIENNIAL REUNION.

MANHATTAN, KAN., May 3, 1902.

To the Alumni of the Kansas State Agricultural College, Greeting:

Again, through the medium of the INDUSTRIALIST, we solicit your interest in our coming triennial reunion. We are able to announce at this date a complete program, which we feel assured will be more representative and enjoyable than that of any former gathering. Having prepared for this, our next and most ardent desire is to secure the largest assemblage of alumni and former students for the Commencement exercises.

Mrs. Nellie Kedzie-Jones will address the alumni and invited guests on Wednesday evening, June 18.

The business session of the alumni, Wednesday, at 2:30 P. M., will be important in character, and your officers solicit your interest and consideration for this particular event.

The triennial reunion and banquet at the College, Thursday evening, June 19, will be the delightful climax of the week.

Every indication is for an unusually large attendance this year. Your officers deem it the part of wisdom to advise you in advance to arrange for your entertainment. The hotels and boarding-houses will be unable to care for nearly all who may desire this entertainment, unless provided for a reasonable time in advance.

If this notice reaches you at some other address than that shown on the wrapper, be kind enough to notify our secretary, C. Jeanette Perry, Manhattan, Kan., to the end that the association as well as the College authorities may have your present address.

At a later date we shall reach you by personal means as far as possible. In the meantime, prepare in advance for your attendance. Faithfully yours, H. C. RUSHMORE, President.

SOME ANALYSES OF COMMERCIAL SEED-CORN.

IN VIEW of the probability that many farmers in the State would be obliged to purchase seed-corn this year, it seemed desirable to make analyses of some seed offered, and, if material differences were found, to publish recommendations. Accordingly, all the varieties offered by the leading seed firm of the State were purchased, and their nitrogen content determined. The results are published in the succeeding table. The seed was apparently of good quality, and its low content of nitrogen simply shows the deficiency of this important element that corn ordinarily exhibits:

Brazilian Flour Corn	1.39	Forsythe's Favorite	1.63
Iowa Gold Mine	1.47	Iowa Silver Mine	1.69
Early Mastodon	1.53	King of the Earliest	1.70
Hickory King	1.54	Kansas Sunflower	1.72
Champion White Pearl	1.59	Golden Beauty	1.74
Improved Leaming	1.62	Pride of the North	1.81

J. T. WILLARD.

In the fall of 1897, the chemist of the Experiment Station, at a joint meeting of the Faculty and the Board of Regents, proposed, as a part of the work of the Chemical Department of the Station, the analysis of varieties of corn, with a view to ascertaining which are highest in nutritive value, and a coöperation between the Chemical, the Farm and the Botanical Departments in efforts to improve this cereal. This met the approval of the Board, and the next spring this work was begun, the three departments named coöperating. In the spring of 1899 the agriculturist of the Station asked to be relieved from further connection with the work, and since then it has been entirely in charge of the botanist and chemist and their assistants. The progress of the work thus far is set forth in Bulletin No. 107, a summary of which appears elsewhere.

The first month's record of the nine cows selected for the Agricultural College test by nine Kansas dairymen, puts the cow "Haster," by E. C. Cowles, first in the list for profit, though her milk and butter do not test as high as "Cowslip," chosen by J. W. Bigger, who ranked third. "Rose of Cunningham," selected by J. W. Cunningham, ranks second so far. The milk yield of the three cows for the month in pounds was: "Haster," 849.5; "Rose of Cunningham," 1200.1; "Cowslip," 761.6. The ration and amount of feed consumed was practically the same in each case.

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PROF. J. D. WALTERS.........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

Dr. S. C. Orr took pictures of a part of the young stock last week.

The bound Volume 27 of the INDUSTRIALIST has come from the State printer.

The farmers' course students gave a dance Monday evening at Harrop's hall, in honor of L. A. Fitz.

The Farm Department rejoices in the arrival of a very fine Percheron colt, of the "male persuasion."

Contractor Schubert has commenced the work of excavating for the basement of the new wing of Library Hall.

The woven-wire fence machine built by the shops for Brownell & Poller, of Lawrence, is reported very satisfactory.

The Manhattan Live Stock and Sales Company hold there regular sales on the first Saturday of each month. The next will be on June 7.

Miss Josephine Berry, who has been teaching at Waterville during the past winter, will sail for Europe June 1 in company with her sister, who lately returned from study abroad.

Dr. Mayo visited Wakefield to inspect the new colt recently added to our live stock, and on Wednesday was called to Walnut and on Thursday to Leavenworth to investigate diseases among horses.

And now Hiawatha and Olathe and some other good Kansas towns are looking enviously at Manhattan's free delivery system and wishing that they had one. This place is getting the name all over the State of being a live, clean town that others may well watch and emulate.—*Nationalist*.

The J. I. C. Threshing Machine Co., of Racine, Wis., has sent the Mechanical Department a traction engine for the purpose of teaching traction engineering. The engine is of fifteen horse power and weighs eight tons. "Old Charley," the one of former days, has been "scrapped."

The seniors gave a tally-ho party to Manhattan Beach Monday evening in honor of L. A. Fitz. About twenty-five jolly seniors enjoyed the pleasant evening, spent in fishing, boat riding, and the numerous other pleasures the Beach affords. Ice-cream and cake were served. Mr. Fitz left Tuesday for Halstead, Kan., where he will assist in the government wheat experiments.

Engineer Lund has just completed a two-inch pipe line from the steam plant to Agricultural Hall, to furnish steam for the creamery work. This pipe, passing through the heating tunnel, will do away with the firing of the boiler in the basement of the Agricultural Hall. The regular steam connections for the complete heating of this building and the new Physical-Science Hall will not be laid till next summer, and will require eight- and ten-inch pipes and six inch returns.

Mrs. J. T. Willard, with her son Charles, started for California April 20. She has gone to Los Angeles to attend the Biennial Convention of the General Federation of Women's Clubs, May 1 to 8, in which she will represent the Domestic Science Club of Manhattan, as the proxy of its president. She and the boy went by way of the Santa Fe, in order to see the wonders of the grand canyon of the Colorado river, and will return by way of the Denver & Rio Grande and Union Pacific. They will visit May Willard-Emrick, at Portland, Ore., before the final start for home. In the meantime Professor Willard is boarding.

It seems almost impossible to erect a large building like the new Physical Science Hall without some serious accidents of life and limb and a still greater number of hair-breadth escapes. Elmer Berry, a brother of Contractor Berry, received his second degree as a master builder last week. He had the misfortune on Wednesday to have his left hand caught under a large rock, crippling three fingers. A few days ago one of the roofers at work on a scaffold near the apex of the main tower lost his hold and fell some ten or twenty feet to a lower scaffold. If he had not been able to get hold of a scantling there he would have fallen fifty or sixty feet to the ground.

The following item is excerpted from the Chicago *Live Stock World*, of April 5. It shows what our neighbors of Iowa are doing for the upbuilding of their agricultural college, and ought to be a pointer to our Kansas lawmakers. The Kansas State Agricultural College has more students to-day in its agricultural courses than Iowa and its income from the endowment fund is considerably less than that of Iowa. Kansas should at least be able to follow her sister states, if not to lead them, in matters of agricultural education. The *World* says: "President Beardshear and Director Curtiss returned to-night from DesMoines, jubilant over passage by both branches of the legislature of the bill authorizing the proposed one-fifth of a mill tax for a period of five years, for building purposes at the Agricultural College. This insures an annual sum, available for the erection of needed buildings, of about $120,000 or a total of $600,000, sufficient to make the Iowa Agricultural College the greatest institution of its kind existing. The old main building will be demolished and a creditible structure erected on the site. An appropriation of $15,000 for the immediate erection of a new barn, and another of $10,000 for stocking the college farm to its full capacity, will, in all probability, be passed before the Hawkeye lawmakers adjourn."

Prof. W. L. Hofer, formerly professor of music at this College, has recently written a piece of instrumental music, entitled "Cleopatra." It is being copyrighted in London and Canada as well as in the United States. The piece is a good one and is bound to become popular in musical circles. It is dedicated to his daughter, Miss Henrietta, a member of the present senior class.

Last summer Prof. J. B. Weems, of the Iowa State College and Experiment Station. sent circular letters to the various experiment stations of the country asking questions concerning the proper character and scope of experiment station bulletins. One of these questions was, "Name five stations which you think publish the best bulletins?" It is pleasant to note that the Kansas station was one of the five named most frequently.

About a month ago the Printing Department bought a No. 5 Underwood typewriter of the Wagner Typewriter Co., No. 13 West Ninth Street, Kansas City, Mo. A notice announcing its arrival was put in the INDUSTRIALIST, and within a short time several of the professors came and examined the machine, with the result that both Professor Popenoe, of the Entomological Department, and Professor Roberts, of the Botanical Department, almost immediately ordered machines, and last week this department ordered one for the Fort Hays branch school. The Underwood seems to be a favorite with all who use them. It took the gold medal at the Paris Exposition.

This is the season of the year when excursions from all parts of the State are beginning to arrive at the Agricultural College. The green campus, the shady walks, the stately buildings, the shops and greenhouses, the drills of the cadets, the open-air concerts by the musical organizations of the institution, the museum and the corrals of thoroughbred cattle form an interesting program for visiting parties. There were several such excursions on the extensive grounds last week, and we are glad to welcome any who may wish to come. The Wamego *Times*, of Friday, March 25, contains the following notes, penned by a member of a visiting party: "The party, which numbered thirteen, took the 11:10 train to Manhattan, where they were met by the Park phaeton from Dewey's. Between that time and 4:25 o'clock, when their home train arrived, they 'did' the town and the State Agricultural College with business like thoroughness, though they were 'on pleasure bent.' At the College they visited the various departments, including the library, museum, Domestic Science hall, dairy, shops, and greenhouses. Professor Walters, instuctor of industrial art, was a most interesting guide through the foundry and shops. Professor Walters is the man who designed Wamego's new park. He has been a member of the Agricultural College Faculty for many years, and much of the artistic work of the campus and buidings originated with him. At an afternoon meeting in the chapel the party had the pleasure of seeing a fairly full assembly of the student body, although none but

regular four-year-course students are admitted at chapel meetings, for lack of seating capacity. An assembly of students is always inspiring, and that of the students of the State Agricultural College was no exception. The party also visited the yards containing the stock of the College farm. An incident of the trip that they enjoyed much, perhaps for its added element of novelty, was the drive, after their return to town, through Dewey's large, finely equipped transfer barn."

The editors were invited by President Nichols to inspect the State Agricultural College, and they found the aim and scope of the school admirable; but the school needs more than it has been given. It is the greatest school of the kind on the globe. The departments are up-to-date. The iron and wood shops, the gymnasium, library, dairy, the live stock, the militia—all good; but more buildings are needed. This great State can well afford to equip the Agricultural College to the point that it may have the facilities to do what it aims to do. A new chapel is needed. Also new and better printing machinery. Printing is taught at the school. But the material and presses are of the crudest kind. If printing is to be taught, it should be taught right. New presses should be installed, also linotypes and power cutters and the very best of labor saving inventions. It would be possible to build up at the College a Printing Department competent to do all the State work at one-third the present cost. But even if this idea is too far advanced, the art of printing can only be hinted at by present methods. A modern printing-office should be installed; also a chair of journalism. So long as newspapers are to be made, those interested should be shown how to make them. If printing is to be done, let the students learn the rudiments by the best means obtainable. It will cost money to get for the Agricultural College all that it needs, but no visitor will fail to be favorably impressed with the idea that when the State invests money for the betterment of the College the people will get the benefit.—*Ewing Herbert, in The Brown County World.*

ALUMNI AND FORMER STUDENTS.

S. J. Adams, '98, has resigned his position as general secretary of the College Y. M. C. A., his resignation to take effect at the end of the College year.

Dr. S. W. Williston, '72, dean of the medical school of the University of Kansas, has been appointed a delegate, by Governor Stanley, to the American Congress on Tuberculosis.

A telegram from Second Lieut. Geo. Crawford [fourth year '97] announces his safe arrival in San Francisco from Porto Rico. He sailed for Manila Tuesday, with the second battery of Eleventh Artillery, of which he is a member. He has taken the examinations for a first lieutenancy and thinks he has been successful in passing. He says he is in good health.—*Mercury.*

Minnie L Copeland, '98, will be graduated from the Mitchell training school for nurses Wednesday evening, May 7, 1902. This school is in connection with the Chicago Homœopathic College. Miss Copeland has been through a two-years' course of thorough training, and with her natural qualifications for the work will undoubtedly meet with success in her profession.

John B. Brown. '87, has been promoted from the Indian school at Pine Ridge, Neb., and made superintendent of the Morris Training School for Indians at Morris, Minn. This school now has one hundred seventy-four students, mostly from the scattered bands of Minnesota and North Dakota, and not from reservations. Superintendent Brown is making an excellent reputation in his field.

R. S. Kellogg, '96, is again in the service of the bureau of forestry. He is now at work in Arizona and recently spent a week in the Santa Catalina mountains, studying the woody species of the mountains and foot-hills with reference to size, abundance, distribution, effect of elevation, moisture, etc., the trip being primarily in the interest of the proposed Santa Catalina forest reserve.

H. D. Orr, '99, writes of a very pleasant and prosperous year at the medical school of Northwestern University. Mr. Orr takes a modest pride in having been awarded a scholarship at the beginning of the year, this being given for superior fitness and preparation. Owing to the proficiency in chemistry which he obtained here, he not only obtained credit on his course for a year of chemistry, but was appointed an assistant in the department of chemistry there.

Miss Sue Long ['96] went to Topeka the first of the week to take the position of society reporter on the staff of the Topeka *Daily Herald.* Miss Long's excellent work on the Manhattan papers since her graduation from College has proved her ability to succeed well in journalism, and her many friends here are pleased that she will have the larger opportunity which city work will give her. Her first assignment was that of going to Kansas City and coming up to Topeka to-day on the special Santa Fe train which takes the national officers of the Federation of Women's Clubs to California.—*Nationalist.*

Chas. L. Marlatt, ['84], of Manhattan, assistant United States entomologist, returned to Washington last week, after an absence of over a year in Japan, China, Philippine Islands, Sumatra, Borneo, Ceylon, Egypt, and other countries. He was visiting those countries for the department of agriculture, and some of the knowledge which he gained has already proved beneficial to the horticultural interests of our country. At Singapore he met another government explorer, David G. Fairchild, ['88], also of Manhattan. Neither knew of the other's presence in that part of the earth. Mr. Marlatt's wife accompanied him on his long journey.—*Topeka State Journal.*

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THE INDUSTRIALIST.

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IMMUNITY AND PROTECTIVE INOCULATION.*

NATURE has provided the animal body with means of combating more or less successfully the action of pathogenic bacteria, *i. e.*, given them an immunity. Immunity is, generally speaking, proof against infection. An immune animal is one in which pathogenic germs do not multiply, or if the tissues are invaded by pathogenic germs it is local, or to a small extent general, and in a short time the resources of nature suffice to destroy the parasitic invader.

Immunity may be natural or acquired, *i. e.*, some animals may have a natural immunity to a certain disease; *e. g.*, cattle are immune to hog cholera. Or individuals of a susceptible species may acquire an immunity to a certain disease; *e. g.*, the calf is susceptible to blackleg, but by inoculation of the attenuated virus an immunity against blackleg may be produced. Natural immunity is probably a result of natural selection, that is, an inherited acquired immunity. Any careful observer has noticed that when an epidemic of any disease is raging, some individual animals are more susceptible than others; some would have the disease in a very mild form, others more severe, and to still others it would be fatal. Finally the result would be that those animals having the greatest resisting power would survive, whilst those most susceptible would die. This resisting power of animals tends to be transmitted to their offspring, generation after generation, through epidemic after epidemic, until it is so marked that the offspring is immune at birth. This would be a natural immunity. The specific cause of natural immunity, whether it has been evolved as above or not, is probably due to cell activity, *i. e.*, the cells produce a substance or a condition in the animals' system that is antagonistic or unfavorable for the development of the germs. The substance or condition produced by the cells may be a natural metabolic product, produced

* Paper read before the Improved Stock Breeders' meeting at Topeka, January 7, 1902.

continually, or it may be produced only when the cells are stimulated by the introduction of germs. It is known that the cells of the body are naturally antagonistic to any injurious foreign material that may be introduced into the body. Their first action is to remove the foreign material, if they can. If they cannot remove it, they surround and build a wall around it, thus cutting it off or separating it from other portions of the body, as in a splinter or tubercle. The same action no doubt would occur when bacteria were introduced into the body.

Again, animals may be free from a disease because they are not exposed to it, *e. g.*, yellow fever. This, however, is not a natural immunity, or at least the freedom from the disease is not a result of an activity in the body.

Natural immunity may be of a whole race, or it may be of a family, or it may be of individuals. Thus typhoid fever, mumps and whooping-cough are diseases, essentially, of man, and the lower animals do not suffer from them when they are prevailing as an epidemic. On the other hand, man has an immunity from many of the diseases of the lower animals, *e. g.*, hog cholera and blackleg. But again, several species, including man, may be susceptible to certain diseases, *e. g.*, glanders and lock-jaw. The fact that there are race immunities and susceptibilities is an important factor in determining quarantine laws.

The immunity may be a family characteristic. Close observers no doubt have noticed that a certain cow's calves are always more susceptible to dysentery, pink eye, blackleg, etc., than some other cow's calves in the same pasture. Or that a certain mare's colts are more susceptible to pink eye, distemper, ring bone, etc., than another mare's colts that are placed practically under the same conditions. And, finally, you have all observed that a certain human family does not have the measles when they are raging as an epidemic, although they were exposed; and another family does not have the whooping-cough, although they were exposed, etc.

Family immunity is probably due to natural selection and heredity. Immunity may be an individual characteristic. To see an unvaccinated man who has been frequently exposed to small-pox and has not taken the disease is of every-day occurrence. Upon reflection you can recall some child of a family of children who failed to have the measles when the other children did, although

he was exposed and under practically the same conditions. Another child, under similar circumstances as the above, who failed to have the mumps; another the whooping-cough, etc. Or, again, you have all seen, in hog-cholera epidemics, from one to ten hogs in most all of the herds that did not have the cholera; or a horse or two in the lot that did not have the distemper. In other words, some animals possess an individual resistance to disease.

Nature has thus provided an immunity which, in some instances, applies to the whole race, in others to the family, and still others to the individual. But there are many diseases, and some to which man is susceptible, for which nature has not provided an immunity, and in this, as in other instances, man has harnessed nature and compelled it to produce conditions by virtue of which man and the lower animals may acquire conditions that render them proof against infection. It was observed that a single non-fatal attack of certain diseases endowed that animal with a freedom from future attacks of the same disease. From this observation we have the embryo of our present protective inoculation.

Early in the eighteenth century it was the custom in parts of the eastern hemisphere to induce small-pox purposely by the inoculation of healthy individuals with the discharge from small-pox patients. The idea was, that if the discharge was taken from a mild case of the disease it would produce a mild form of the disease, and after recovery he was protected against future attacks of the same disease. Jenner was the first scientist to advocate a method that was practical, not frequently fatal, and that gave an immunity. He was an apprentice and had noticed the frequent occurrence among milkmaids of an individual immunity to small-pox, and called his preceptor's, the noted Doctor Hunter's, attention to this fact, but failed to interest him. With perseverence and patience Jenner visited dairies, investigated, and observed that in many instances the milkmaids had contracted sores on their hands from sores on the cows' udder, and had never been attacked with small-pox. He continued his work, kept investigating and experimenting, and May 14, 1796, was the memorable day when Edward Jenner transferred cow-pox from the hand of Sarah Nelmers, a dairy maid, into the arms of Jas. Phipps, a healthy boy eight years old, who was afterwards inoculated with small-pox and proved to be immune.

If any man that has ever existed deserves praise it is surely

Jenner. There are now many diseases that are being controlled by methods that were directly evolved from Jenner's vaccination experiments. To understand the principles of protective inoculation, let us first review some of the factors of infectious diseases. The cause of bacterial disease is, according to most scientists of the present time, due to a product of the bacteria commonly known as toxin; for it has been demonstrated that the toxin of pathogenic bacteria, when introduced into the body of man or the lower animals, produces the same symptoms that are produced when the bacteria are introduced, and if sufficient toxin be introduced death would result and post-mortem would reveal practically the same lesions that are found when the animal dies naturally from the infectious disease. As an example of the action of the toxin, let me cite you to the recent diphtheria antitoxin calamity in St. Louis.

Generally speaking, toxins are intense poisons and may be compared to any other poison. The physiological action of toxins is, no doubt, very similar to the action of any other poison. Toxins have a more or less selective action, as do other poisons. The tissues of an animal body will acquire a tolerance or get used to various poisons, as chloral, arsenic, opium, etc. So will the tissues of a body acquire a tolerance of or get used to toxins. A person may acquire an immunity to chloral, arsenic, opium, etc., by the use of the same things in increasing doses. So may a person acquire an immunity to the toxins of bacteria by the use of the toxin in increasing doses. This fact was applied by Doctors Salmon and Smith, when they demonstrated that immunity might be conferred upon animals by injecting into them the toxin of the pathogenic bacteria. This seems to indicate that immunity may be produced by pure chemical means. It is possible, by the repeated injections of non-fatal but gradually increasing doses of toxins into the susceptible animals, to increase the resisting value of those animals far in excess of that ever seen to exist in immunity acquired by an attack of the disease. It is in this way that antitoxic serums are obtained that are of sufficient strength to be of service in the treatment of disease already in progress. An antitoxin is a substance that neutralizes the toxin. It bears the same relation to the corresponding toxin that an antidote does to a corresponding poison.

Immunity may also be acquired by the use of the attenuated or

weakened germ. In 1880, Pasteur demonstrated the possibility of decreasing the virulence or disease-producing power of the chicken-cholera germ so that it would produce only a mild attack, after which the chickens had an immunity to further attacks of the same disease. He proved the same thing for the anthrax germ in sheep a little later.

Living vaccines have since been prepared for various infections, and in some cases have been very successful. Vaccines are prepared by subjecting the germs to some unfavorable condition or conditions. Consequently their vitality is reduced and they are not capable of producing a severe attack of a disease. Just as corn, barley, oats, wheat, etc., would lose their vitality if transplanted to some unfavorable climatic condition as to temperature, moisture, etc. Thus the blackleg and anthrax vaccines are prepared by exposing the germs to a high temperature. Antirabic vaccine is prepared by desiccation, chicken-cholera by cultivation in an artificial culture medium. Then immunity may be acquired by introducing the toxin in gradually increasing doses, by the use of an antitoxin or by the use of a germ in a weakened or attenuated form.

The antitoxin is curative as well as preventive. The toxin is a pure preventive and the living vaccine is, generally speaking, a preventive, although in some cases vaccination after symptoms appear seems to be beneficial.

Some Statistics.—From January 17, 1899, to October 1, 1900, 54,393 head of cattle were inoculated with Kansas Experiment Station blackleg, double vaccine; 323 died of blackleg after vaccination, 2,301 died of blackleg in the same herds in an equal length of time before vaccination. That is, less than 1.6 per cent died after vaccination, and 4.23 per cent died of blackleg before. Then vaccination saved 3.63 per cent.

According to the twelfth biennial report of the State Board of Agriculture of Kansas, there were 3,155,625 cattle in the State in 1900, and were valued at $84,444,206. Estimating that one-half the cattle were of susceptible age, vaccination would save 57,272 cattle, or about $1,000,000 per year for Kansas, if all susceptible cattle were vaccinated. The Bureau of Animal Industry, of Washington, D. C., sent out over 1,500,000 doses of blackleg vaccine to various parts of the United States in 1900. According to the report of the Secretary of Agriculture, 1 per cent die after

vaccination and nearly 10 per cent before vaccination, making an enormous saving to the stockmen of the United States.

Anthrax.—Chamberland's summary of the results of anthrax vaccination made in France by the Pasteur method, from 1882 to 1894, is as follows:

Total number of sheep vaccinated..........	1,788,677
Total number of cattle vaccinated..........	200,962

Before vaccination, about 10 per cent of the sheep and about 5 per cent of the cattle died of anthrax. After vaccination, .94 per cent of sheep and .34 per cent of cattle died of anthrax; or a difference of over 9 per cent of sheep and 4½ per cent of cattle. This saved France annually $95,000 in sheep and $38,000 in cattle, or a grand total of $133,000.

Podmolinoff's summary of the inoculation in Austria shows about the same figures. Professor Cewkowski, of Russia, found that the losses from anthrax diminished in flocks in which protective inoculations were practiced from 8.3 per cent, in 1884, to .13 per cent.

Hog Cholera or Swine Plague.—The Bureau of Animal Industry treated 21,000 hogs in Mills, Page, Montgomery and Freemont counties, Iowa, from April 15 to December 1, 1899, with serum from horses, cows or donkeys that had been immunized by inoculation of the hog-cholera or swine-plague germ or the germ products, with a loss of 29.5 per cent. Statistics indicate that about 31 per cent of the hogs not treated survive. A. T. Kinsley.

THE GAS ENGINE.

THE steam-engine has been most carefully studied and improved ever since Captain Savery took out his first patent in England, over two centuries ago. As a result, we now have approximately what seems to be the most perfect transformation of the heat energy of steam into useful mechanical energy that man is capable of developing.

Had the gas engine received this careful attention for a like period of time, it would doubtless be a much more effective machine at the present time. Perhaps the greatest drawback to its advancement was the early idea that the combustion of gas must be slow, and it required many failures and years of experience to teach the fundamental principle that rapidity of action, in both combustion and expansion, is the basis of success

in explosive motors. With this important truth, and the demand for small prime movers requiring but little care, the gas engine has grown in application and usefulness to be a successful rival of the steam-engine. It has the disadvantage of being subjected to very great shocks when the gas is exploded, requiring that it be built heavy and strong. Again, in the Otto cycle, which is now used almost universally, the piston must make four strokes for each gas explosion, and the fly-wheel must be large and heavy enough to do the work of three of the strokes without too mnch fluctuation of speed.

The gas engine is just as much a heat engine as is the steam-engine, the only difference being in the agent employed. It is an easy matter to calculate almost exactly the amount of heat converted into energy available for work, and the gas engine has the distinction of converting a greater percentage of the heat supplied to it into useful work than has the steam-engine. These now important facts were at first regarded with but little interest, gas being employed only as a matter of convenience, and by many regarded as a poor apology for steam. This high efficiency is, however, leading scientific men to the study of the merits and defects of the machine much more closely than ever before. Any material amount of saving in heat means a great saving in the expense of motive power, providing the same amount of work can be accomplished with the same convenience.

There have been a great variety of this class of engines conceived and described, and many of them constructed, but the only type practically in use at the present time is that invented by Mr. Otto. In the course of a tedious lawsuit, it became evident that the cycle invented by Mr. Otto had been conceived and very minutely described by Beau De Rochas. It is, however, very probable that the mechanical world would never have profited by the ideas of De Rochas had they not been put into practical use by Otto. We are therefore inclined to give the full credit of the invention to the latter. It is interesting to note, that although a number of ingenious arrangements claiming distinct advantages over the Otto cycle were in use they were promptly abandoned at the expiration of Otto's patent.

In this cycle we have, first, suction, or the drawing in of the charge during the outward stroke; second, compression during the return stroke; third, ignition near the dead point, followed by

expansion during the next outward stroke; fourth, exhaust, or the discharge of the burnt gases during the second return stroke. These operations require for their completion two revolutions of the engine, and the power is applied during one-fourth of this period—that is, at the second outward stroke. During this stroke energy has to be stored in the fly-wheel for the next three strokes.

As for regularity, it is easy to adjust the size of the fly-wheel so as to give the required steadiness, provided each operation is properly carried out. But if a misfire occur, the work for four complete strokes has to be taken out of the fly-wheel and restored again before normal conditions are regained.

Governing may be done in various ways: by completly cutting out the power for one stroke, or by diminishing the force of explosion, which latter result may be gotten by either weakening the explosive gas by introducing more air, or retaining more burnt gas, or by reducing compression.

Compression would seem to be a direct loss of work, or working the engine against itself, but by its adoption the gas consumption was reduced from sixty cubic feet per horse-power per hour to twenty-five cubic feet per horse-power per hour, thus saving more than half the expense of fuel.

The indicator card from the gas engine bears but little resemblance to that of a well-regulated steam-engine, though it can be taken in the same way. Instead of starting out with full pressure, as in the case of the steam-engine, we have a line corresponding to the atmospheric line in which the explosive mixture is drawn into the cylinder through the open suction valves. In the second stroke we have compression, and the line drawn by the indicator will be a curve going from the atmospheric line up to perhaps one-half of the maximum pressure at the end of the stroke. This curve is usually called an adiabatic curve, since it is assumed that the heat generated by the compression remains in the gas. At the end of this adiabatic the explosion or ignition of the mixture takes place, in consequence of which the pressure suddenly rises to its maximum, and the line described by the indicator will be almost perpendicular to the atmospheric line. This increase of pressure is due entirely to the heating of the gases, and the amount of heat furnished by the gases determines the height to which the line will rise. This burning is not completly instan-

taneous, but continues during the next stroke of the piston, and is known as nachbrennen, or after-burning.

During the third stroke the curve described usually approximates the adiabatic, but is apt to differ from it very greatly on account of the continued combustion referred to above. At the end of this the exhaust opens, and the pressure falls almost immediately, giving a slight curve. It does not drop quite to the atmospheric line, however, since in the next and last stroke the burnt gases are driven from the cylinder, thus giving a pressure slightly above that of the atmospheric. The cycle is now completed, and the engine is ready to receive a fresh supply of gas, compress and explode it, and reject the burnt products.

Since the suction valve is opened but once in four strokes, it is not so easy a matter to provide for its motion as it is to provide for the motion of a steam valve. It cannot be actuated directly from the crank shaft, for any motion directly derived from this will be repeated every revolution. There have been numerous devices introduced for this, the simplest perhaps being a lay-shaft driven at half the speed of the crank shaft.

In driving dynamos by the gas engine the great disadvantage to be overcome is the unsteadiness of motion, which in a small plant is a very serious defect. All gas engines are subject more or less to these pulsations, although heavy fly-wheels, multiplicity of cylinders, with alternating explosions and efficient governing, tend to make these objectionable features less apparent.

Belts or similar driving gears seem to have been considered essential, and even then the speed fluctuations in many engines render them unfit for use in electric lighting. A recent improvement gotten up by the manufacturers of the Nash gas engine is reported to be proving a success. The engine is directly connected with the dynamo, and an electric spark is used to ignite the gas in the cylinders. The connection between the dynamo and the engine is made by means of a peculiarly constructed friction clutch, which is located inside the fly-wheel and automatically controls the dynamo speed, regardless of the pulsating movement of the engine. Close observations of the volt meter are reported to have failed to show any pulsating effect in the current, and in fact the steadiness of the current appeared to be far superior to the average.

Owing to its convenience for some usages, and the improve-

ments being continually made upon it, as well as the probable high efficiency and the small demand for attention, the gas engine seems to have a fair outlook to replace the steam-engine to a large extent not many years in the future. W. M. SAWDON.

WHOLE KAFIR-CORN COMPARED WITH GROUND KAFIR-CORN FOR YOUNG CALVES.

(Press Bulletin No. 114, issued from Department of Dairy Husbandry.)

TWENTY head of young grade Hereford, Shorthorn and Angus calves were purchased by the Kansas Experiment Station during April and May, 1901. The feed of these calves was gradually changed to skim-milk, with what grain they would eat, composed of a mixture of whole and ground Kafir-corn. It was found that the calves would eat the ground Kafir-corn when from ten days to two weeks of age, and would begin to eat the whole Kafir-corn when from three to four weeks old. On June 19, these calves were divided into two lots, as nearly equal as possible, the lot to receive ground Kafir-corn weighing 1570 pounds, or 157 pounds per calf, and the one to receive whole Kafir-corn weighed 1577 pounds, or 157.7 pounds per head. Each lot was fed all the skim-milk, grain and hay the calves would eat without scouring. The roughness for both lots consisted of prairie hay only until the calves were twelve weeks old. Alfalfa was then added gradually, and for a time constituted one-half of the roughness fed, and later supplanted the prairie hay altogether. Fresh water and salt were available at all times.

GROUND KAFIR-CORN LOT.—For the one hundred and twelve days under experiment, these ten calves consumed 14,748 pounds of skim-milk, 1394 pounds of ground Kafir-corn, 2381 pounds of prairie hay, 125 pounds orchard-grass hay, and 6222 pounds alfalfa hay. The total gain of the lot during the experiment was 1580 pounds, or 1.41 pounds daily per calf. With skim-milk at fifteen cents per hundredweight, grain at fifty cents per hundredweight (plus three cents per bushel or six cents per hundredweight for grinding), and hay at $4.00 per ton, the feed cost of raising these calves amounts to $47.37, or $4.73 per head. The cost per hundred pounds of gain is as follows: Skim-milk, $1.40; grain, $0.49; roughness, $1.10; total, $2.99.

WHOLE KAFIR-CORN LOT.—These calves consumed 14,620 pounds of skim-milk, 1641 pounds whole Kafir-corn, 2381 pounds

prairie hay, 125 pounds orchard-grass hay, and 5982 pounds alfalfa hay. The total gain was 1406 pounds, or 1.26 pounds daily per calf. The feed cost amounts to $47.09, or $4.70 per head. The cost per hundred pounds of gain is as follows: Skim-milk, $1.56; grain, $0.58; roughness, $1.20; total, $3.34.

Comparing the two lots it will be noticed that the whole Kafir-corn lot consumed 247 pounds more grain but 240 pounds less of alfalfa hay and made 74 pounds less gain. There were a large number of grains, in the case of the whole Kafir-corn lot, that passed through the calves, undigested. This experiment indicates that better and more economical gains are made from ground Kafir-corn than from the whole grain. Nevertheless, if a man is so situated that he cannot grind his Kafir-corn, very fair gains can be made with the whole seed. Again, it is possible to feed the ground Kafir-corn the first two or three months and then gradually change to the whole. The weekly weights and gains show that the calves receiving whole Kafir-corn gained nearly as well the last five weeks of the experiment as those receiving the ground Kafir-corn. Feed ground Kafir-corn until the calf is three or four months old; then if it is more convenient or economical the whole Kafir-corn may be substituted. D. H. OTIS.

One feature of the entertainment was a visit to the State Agricultural College. This institution has grown with giant strides until now it has nearly 1500 students. Brown county is well represented there by twenty or more students. The efforts of the institution are directed towards furnishing a practical education. In the Dairy Department the students are taught how to feed the cow; what foods produce milk and what fat; how to test the milk to determine its richness, and so on through the various stages until it becomes choice creamery butter. In the shop a general knowledge of tools and their uses and abuses are given. In the Domestic Science Department the girls are taught relative values of foods and how to prepare them skillfully and economically. They are also taught how to sew, mend and patch. These are but a few of the many courses that are given, but they will serve to illustrate the practical character of the instruction given. The time has gone by when the Kansan needs to send his sons and daughters away to be educated. Our State Agricultural College is the best of its kind, and every loyal Kansan should be proud of it.—*Kansas Democrat.*

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.
Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

Nearly all the catalogue matter has gone to the State printer.

Born, to Capt. and Mrs. Ralph Harrison, Fort Meyer, Va., a daughter.

Doctor Mayo was called to Tribune on Tuesday on State sanitary work.

The Creamery Department is building a new refrigerator, measuring 8×8×10 feet, for storing butter.

Hon. Geo. Martin, secretary of the State Historical Society, was a welcome visitor at the College last Friday morning.

Engineer J. Lund is placing a new two hundred-gallon tank in the basement of the girls' gymnasium, to furnish hot water for the bath rooms.

The contractor of the new addition to the Library has already completed the work of excavating and is busy laying the concrete foundations. Mr. Schubert is a hustler.

The basket-ball game played last Saturday afternoon in the gymnasium, between the first-year girls and the ladies of the Faculty, resulted in a decided victory for the girls.

The graduating exercises of the Manhattan schools will be held at Wareham's opera-house, May 22. The class numbers forty-one candidates—sixteen boys and twenty-five girls.

Posters are out announcing a "May lunch" to be given by the Y. W. C. A. girls, at Domestic Science Hall on May 15, from 5:30 to 7:30 P. M. Everybody is invited. Price of lunch, twenty cents.

A number of electrical engineering students, under the direction of Professor Hartman, are preparing some coils for the purpose of testing the hysteresis losses in the various kinds of iron.

The Secretary and her assistants are busy preparing the list of students who attended College during the present College year, for publication in the annual catalogue. We may be able to give the figures by terms and classes in our next issue.

The annual conference of the Congregational church of Kansas met at Manhattan last week, and many of the delegates took advantage of the opportunity to visit the College. There was probably a hundred stranger on the campus on Saturday morning, many attending chapel exercises.

Contractors C. A. Fellows and J. W. Berry, of the new Physical-Science Hall, were here on Wednesday, looking after the progress of their work. Architect Haskell, of Lawrence, was also here one day.

Mr. J. Hedke, of Hanover, Washington county, was here last week for several days to look over our orchards, vineyards and gardens and to learn of new methods in orcharding. Mr. Hedke has a large fruit farm near Hanover.

Proofreader Carruth, of the State printer's office, Topeka, was a welcome visitor at the Printing Department on Saturday last. Mr. Carruth and Superintendent Rickman were associate workmen in the State printery for several years.

President Nichols was at the Hays Experiment Station on Sunday, Monday and Tuesday of last week. He reports the work of the Station as progressing satisfactorily, but all the cultivated plats in need of rain. It seems that the rains of last week extended but little beyond Salina.

Ex-Regent C. B. Daughters moved his family here and they are being installed in their new home, known as the Old Williston Homestead. The College is the especial attraction. Mr. Daughters will spend much of his time at their old home, Lincoln, Kan., where he has large property interests.—*Nationalist.*

The Horticultural Department is rebuilding the walks north of Main Building, with branch walks to the Gymnasium, the new Physical-Science Building, and Agricultural Hall. The new walks will be wider and more direct than the old have been. All walks are being constructed of cinders, with brick rims.

The INDUSTRIALIST of last week forgot to mention a happy social event—the entertainment of the Faculty and their wives, on Tuesday evening, by Doctor and Mrs. Mayo, at the handsome residence of the hosts. The program of the evening consisted of social chats, music, literary puns and light refreshments, and all the guests report a very good time.

Professor Otis was at Hill City on Monday of last week to inspect the Pomeroy model farm, near that city. This farm is tilled according to the so-called Campbell method, which is undoubtedly well known to all of our readers. The professor brought back with him a number of very interesting specimens of wheat and tree growths produced by the Campbell system.

Lieut. W. A. Cavenaugh, Twentieth United States Infantry, now stationed at Fort Sheridan, Ill., writes Doctor Mayo that he expects to be here commencement and attend the triennial reunion. He reports a tedious trip of thirty-nine days from Manila, during which the transport was disabled twelve times, and after reaching San Francisco their things were so thoroughly disinfected that most of them were spoiled. He is thankful to be back in "the States" again.

During the past month the College creamery has received 58,299 pounds of milk, costing $570.01 and yielding 2280 pounds of butter fat. This milk was furnished by thirty-six patrons. The highest receipt was $7.42 per cow; the lowest $2.18. This valuation was obtained by valuing butter fat at twenty-five cents and skim-milk at fifteen cents a hundred pounds. The largest check for milk went to B. B. Bayles, amounting to $36.67; the second went to G. R. Bell, and the third to Porter Westgate. A large number of patrons received over twenty dollars each.

During the past four months the College has prepared and sold about $4,700 worth of prairie-dog poison and orders for more are still pouring in from all parts of the West. From fifteen to sixty cans are going out every day. The mixture prepared by Prof. D. E. Lantz seems to be perfectly satisfactory. Had the poison sold up to date been prepared by individual farmers at current drug prices instead of our wholesale prices obtained from large eastern factories, it would have cost the State over $12,000, not counting the labor of preparing it, the danger of mixing it, the probability of getting the wrong proportions of the ingredients, and the possibility of getting inferior materials.

The seniors are working at their theses with commendable energy. A majority of the selected subjects require original drawings, diagrams, blue-prints, surveys, microscopic work, photographs, etc., which consume much time and require persistent effort. Among the selected subjects are the following: A railroad connecting the College with the Union Pacific depot; The prairie-dog and its extermination; A new Horticultural Building for the Kansas State Agricultural College; The coal measures and coal veins of Kansas; Forestry in Kansas; Poultry raising on a commercial scale; Home grounds; etc. We are glad to see that so many of the students have selected subjects of a scientific and practical character.

ALUMNI AND FORMER STUDENTS.

Miss Phoebe Turner, '94, was a visitor at College. She has been teaching, and is now planning a graduate course.

Ralph E. McDowell [student in 1888], who was recently appointed a second lieutenant in the regular army, has been assigned to the Twelfth Cavalry and ordered to join his regiment, now stationed at Houston, Tex.—*Mercury.*

Dr. S. W. Williston ['72], professor of historical geology and vertebrate anatomy at the University of Kansas, has decided to accept a similar chair at the University of Chicago, at a salary of $3,500 a year. Doctor Williston has had the offer under consideration for some time, and has made considerable investigation of the proposed change, and his decision to go to Chicago is no surprise to his friends here. Doctor Williston is one of the strong members of the Kansas faculty and has a reputation the country over in his line of work.—*Topeka Herald.*

THE INDUSTRIALIST.

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IMMUNITY AND PROTECTIVE INOCULATION.*

NATURE has provided the animal body with means of combating more or less successfully the action of pathogenic bacteria, *i. e.*, given them an immunity. Immunity is, generally speaking, proof against infection. An immune animal is one in which pathogenic germs do not multiply, or if the tissues are invaded by pathogenic germs it is local, or to a small extent general, and in a short time the resources of nature suffice to destroy the parasitic invader.

Immunity may be natural or acquired, *i. e.*, some animals may have a natural immunity to a certain disease; *e. g.*, cattle are immune to hog cholera. Or individuals of a susceptible species may acquire an immunity to a certain disease; *e. g.*, the calf is susceptible to blackleg, but by inoculation of the attenuated virus an immunity against blackleg may be produced. Natural immunity is probably a result of natural selection, that is, an inherited acquired immunity. Any careful observer has noticed that when an epidemic of any disease is raging, some individual animals are more susceptible than others; some would have the disease in a very mild form, others more severe, and to still others it would be fatal. Finally the result would be that those animals having the greatest resisting power would survive, whilst those most susceptible would die. This resisting power of animals tends to be transmitted to their offspring, generation after generation, through epidemic after epidemic, until it is so marked that the offspring is immune at birth. This would be a natural immunity. The specific cause of natural immunity, whether it has been evolved as above or not, is probably due to cell activity, *i. e.*, the cells produce a substance or a condition in the animals' system that is antagonistic or unfavorable for the development of the germs. The substance or condition produced by the cells may be a natural metabolic product, produced

* Paper read before the Improved Stock Breeders' meeting at Topeka, January 7, 1902.

continually, or it may be produced only when the cells are stimulated by the introduction of germs. It is known that the cells of the body are naturally antagonistic to any injurious foreign material that may be introduced into the body. Their first action is to remove the foreign material, if they can. If they cannot remove it, they surround and build a wall around it, thus cutting it off or separating it from other portions of the body, as in a splinter or tubercle. The same action no doubt would occur when bacteria were introduced into the body.

Again, animals may be free from a disease because they are not exposed to it, *e. g.*, yellow fever. This, however, is not a natural immunity, or at least the freedom from the disease is not a result of an activity in the body.

Natural immunity may be of a whole race, or it may be of a family, or it may be of individuals. Thus typhoid fever, mumps and whooping-cough are diseases, essentially, of man, and the lower animals do not suffer from them when they are prevailing as an epidemic. On the other hand, man has an immunity from many of the diseases of the lower animals, *e. g.*, hog cholera and blackleg. But again, several species, including man, may be susceptible to certain diseases, *e. g.*, glanders and lock-jaw. The fact that there are race immunities and susceptibilities is an important factor in determining quarantine laws.

The immunity may be a family characteristic. Close observers no doubt have noticed that a certain cow's calves are always more susceptible to dysentery, pink eye, blackleg, etc., than some other cow's calves in the same pasture. Or that a certain mare's colts are more susceptible to pink eye, distemper, ring bone, etc., than another mare's colts that are placed practically under the same conditions. And, finally, you have all observed that a certain human family does not have the measles when they are raging as an epidemic, although they were exposed; and another family does not have the whooping-cough, although they were exposed, etc.

Family immunity is probably due to natural selection and heredity. Immunity may be an individual characteristic. To see an unvaccinated man who has been frequently exposed to small-pox and has not taken the disease is of every-day occurrence. Upon reflection you can recall some child of a family of children who failed to have the measles when the other children did, although

he was exposed and under practically the same conditions. Another child, under similar circumstances as the above, who failed to have the mumps; another the whooping-cough, etc. Or, again, you have all seen, in hog-cholera epidemics, from one to ten hogs in most all of the herds that did not have the cholera; or a horse or two in the lot that did not have the distemper. In other words, some animals possess an individual resistance to disease.

Nature has thus provided an immunity which, in some instances, applies to the whole race, in others to the family, and still others to the individual. But there are many diseases, and some to which man is susceptible, for which nature has not provided an immunity, and in this, as in other instances, man has harnessed nature and compelled it to produce conditions by virtue of which man and the lower animals may acquire conditions that render them proof against infection. It was observed that a single non-fatal attack of certain diseases endowed that animal with a freedom from future attacks of the same disease. From this observation we have the embryo of our present protective inoculation.

Early in the eighteenth century it was the custom in parts of the eastern hemisphere to induce small-pox purposely by the inoculation of healthy individuals with the discharge from small-pox patients. The idea was, that if the discharge was taken from a mild case of the disease it would produce a mild form of the disease, and after recovery he was protected against future attacks of the same disease. Jenner was the first scientist to advocate a method that was practical, not frequently fatal, and that gave an immunity. He was an apprentice and had noticed the frequent occurrence among milkmaids of an individual immunity to small-pox, and called his preceptor's, the noted Doctor Hunter's, attention to this fact, but failed to interest him. With perseverence and patience Jenner visited dairies, investigated, and observed that in many instances the milkmaids had contracted sores on their hands from sores on the cows' udder, and had never been attacked with small-pox. He continued his work, kept investigating and experimenting, and May 14, 1796, was the memorable day when Edward Jenner transferred cow-pox from the hand of Sarah Nelmers, a dairy maid, into the arms of Jas. Phipps, a healthy boy eight years old, who was afterwards inoculated with small-pox and proved to be immune.

If any man that has ever existed deserves praise it is surely

Jenner. There are now many diseases that are being controlled by methods that were directly evolved from Jenner's vaccination experiments. To understand the principles of protective inoculation, let us first review some of the factors of infectious diseases. The cause of bacterial disease is, according to most scientists of the present time, due to a product of the bacteria commonly known as toxin; for it has been demonstrated that the toxin of pathogenic bacteria, when introduced into the body of man or the lower animals, produces the same symptoms that are produced when the bacteria are introduced, and if sufficient toxin be introduced death would result and post-mortem would reveal practically the same lesions that are found when the animal dies naturally from the infectious disease. As an example of the action of the toxin, let me cite you to the recent diphtheria antitoxin calamity in St. Louis.

Generally speaking, toxins are intense poisons and may be compared to any other poison. The physiological action of toxins is, no doubt, very similar to the action of any other poison. Toxins have a more or less selective action, as do other poisons. The tissues of an animal body will acquire a tolerance or get used to various poisons, as chloral, arsenic, opium, etc. So will the tissues of a body acquire a tolerance of or get used to toxins. A person may acquire an immunity to chloral, arsenic, opium, etc., by the use of the same things in increasing doses. So may a person acquire an immunity to the toxins of bacteria by the use of the toxin in increasing doses. This fact was applied by Doctors Salmon and Smith, when they demonstrated that immunity might be conferred upon animals by injecting into them the toxin of the pathogenic bacteria. This seems to indicate that immunity may be produced by pure chemical means. It is possible, by the repeated injections of non-fatal but gradually increasing doses of toxins into the susceptible animals, to increase the resisting value of those animals far in excess of that ever seen to exist in immunity acquired by an attack of the disease. It is in this way that antitoxic serums are obtained that are of sufficient strength to be of service in the treatment of disease already in progress. An antitoxin is a substance that neutralizes the toxin. It bears the same relation to the corresponding toxin that an antidote does to a corresponding poison.

Immunity may also be acquired by the use of the attenuated or

weakened germ. In 1880, Pasteur demonstrated the possibility of decreasing the virulence or disease-producing power of the chicken-cholera germ so that it would produce only a mild attack, after which the chickens had an immunity to further attacks of the same disease. He proved the same thing for the anthrax germ in sheep a little later.

Living vaccines have since been prepared for various infections, and in some cases have been very successful. Vaccines are prepared by subjecting the germs to some unfavorable condition or conditions. Consequently their vitality is reduced and they are not capable of producing a severe attack of a disease. Just as corn, barley, oats, wheat, etc., would lose their vitality if transplanted to some unfavorable climatic condition as to temperature, moisture, etc. Thus the blackleg and anthrax vaccines are prepared by exposing the germs to a high temperature. Antirabic vaccine is prepared by desiccation, chicken-cholera by cultivation in an artificial culture medium. Then immunity may be acquired by introducing the toxin in gradually increasing doses, by the use of an antitoxin or by the use of a germ in a weakened or attenuated form.

The antitoxin is curative as well as preventive. The toxin is a pure preventive and the living vaccine is, generally speaking, a preventive, although in some cases vaccination after symptoms appear seems to be beneficial.

Some Statistics.—From January 17, 1899, to October 1, 1900, 54,393 head of cattle were inoculated with Kansas Experiment Station blackleg, double vaccine; 323 died of blackleg after vaccination, 2,301 died of blackleg in the same herds in an equal length of time before vaccination. That is, less than 1.6 per cent died after vaccination, and 4.23 per cent died of blackleg before. Then vaccination saved 3.63 per cent.

According to the twelfth biennial report of the State Board of Agriculture of Kansas, there were 3,155,625 cattle in the State in 1900, and were valued at $84,444,206. Estimating that one-half the cattle were of susceptible age, vaccination would save 57,272 cattle, or about $1,000,000 per year for Kansas, if all susceptible cattle were vaccinated. The Bureau of Animal Industry, of Washington, D. C., sent out over 1,500,000 doses of blackleg vaccine to various parts of the United States in 1900. According to the report of the Secretary of Agriculture, 1 per cent die after

vaccination and nearly 10 per cent before vaccination, making an enormous saving to the stockmen of the United States.

Anthrax.—Chamberland's summary of the results of anthrax vaccination made in France by the Pasteur method, from 1882 to 1894, is as follows:

Total number of sheep vaccinated..........	1,788,677
Total number of cattle vaccinated..........	200,962

Before vaccination, about 10 per cent of the sheep and about 5 per cent of the cattle died of anthrax. After vaccination, .94 per cent of sheep and .34 per cent of cattle died of anthrax; or a difference of over 9 per cent of sheep and 4½ per cent of cattle. This saved France annually $95,000 in sheep and $38,000 in cattle, or a grand total of $133,000.

Podmolinoff's summary of the inoculation in Austria shows about the same figures. Professor Cewkowski, of Russia, found that the losses from anthrax diminished in flocks in which protective inoculations were practiced from 8.3 per cent, in 1884, to .13 per cent.

Hog Cholera or Swine Plague.—The Bureau of Animal Industry treated 21,000 hogs in Mills, Page, Montgomery and Freemont counties, Iowa, from April 15 to December 1, 1899, with serum from horses, cows or donkeys that had been immunized by inoculation of the hog-cholera or swine-plague germ or the germ products, with a loss of 29.5 per cent. Statistics indicate that about 31 per cent of the hogs not treated survive. A. T. KINSLEY.

THE GAS ENGINE.

THE steam-engine has been most carefully studied and improved ever since Captain Savery took out his first patent in England, over two centuries ago. As a result, we now have approximately what seems to be the most perfect transformation of the heat energy of steam into useful mechanical energy that man is capable of developing.

Had the gas engine received this careful attention for a like period of time, it would doubtless be a much more effective machine at the present time. Perhaps the greatest drawback to its advancement was the early idea that the combustion of gas must be slow, and it required many failures and years of experience to teach the fundamental principle that rapidity of action, in both combustion and expansion, is the basis of success

in explosive motors. With this important truth, and the demand for small prime movers requiring but little care, the gas engine has grown in application and usefulness to be a successful rival of the steam-engine. It has the disadvantage of being subjected to very great shocks when the gas is exploded, requiring that it be built heavy and strong. Again, in the Otto cycle, which is now used almost universally, the piston must make four strokes for each gas explosion, and the fly-wheel must be large and heavy enough to do the work of three of the strokes without too mnch fluctuation of speed.

The gas engine is just as much a heat engine as is the steam-engine, the only difference being in the agent employed. It is an easy matter to calculate almost exactly the amount of heat converted into energy available for work, and the gas engine has the distinction of converting a greater percentage of the heat supplied to it into useful work than has the steam-engine. These now important facts were at first regarded with but little interest, gas being employed only as a matter of convenience, and by many regarded as a poor apology for steam. This high efficiency is, however, leading scientific men to the study of the merits and defects of the machine much more closely than ever before. Any material amount of saving in heat means a great saving in the expense of motive power, providing the same amount of work can be accomplished with the same convenience.

There have been a great variety of this class of engines conceived and described, and many of them constructed, but the only type practically in use at the present time is that invented by Mr. Otto. In the course of a tedious lawsuit, it became evident that the cycle invented by Mr. Otto had been conceived and very minutely described by Beau De Rochas. It is, however, very probable that the mechanical world would never have profited by the ideas of De Rochas had they not been put into practical use by Otto. We are therefore inclined to give the full credit of the invention to the latter. It is interesting to note, that although a number of ingenious arrangements claiming distinct advantages over the Otto cycle were in use they were promptly abandoned at the expiration of Otto's patent.

In this cycle we have, first, suction, or the drawing in of the charge during the outward stroke; second, compression during the return stroke; third, ignition near the dead point, followed by

expansion during the next outward stroke; fourth, exhaust, or the discharge of the burnt gases during the second return stroke. These operations require for their completion two revolutions of the engine, and the power is applied during one-fourth of this period—that is, at the second outward stroke. During this stroke energy has to be stored in the fly-wheel for the next three strokes.

As for regularity, it is easy to adjust the size of the fly-wheel so as to give the required steadiness, provided each operation is properly carried out. But if a misfire occur, the work for four complete strokes has to be taken out of the fly-wheel and restored again before normal conditions are regained.

Governing may be done in various ways: by completly cutting out the power for one stroke, or by diminishing the force of explosion, which latter result may be gotten by either weakening the explosive gas by introducing more air, or retaining more burnt gas, or by reducing compression.

Compression would seem to be a direct loss of work, or working the engine against itself, but by its adoption the gas consumption was reduced from sixty cubic feet per horse-power per hour to twenty-five cubic feet per horse-power per hour, thus saving more than half the expense of fuel.

The indicator card from the gas engine bears but little resemblance to that of a well-regulated steam-engine, though it can be taken in the same way. Instead of starting out with full pressure, as in the case of the steam-engine, we have a line corresponding to the atmospheric line in which the explosive mixture is drawn into the cylinder through the open suction valves. In the second stroke we have compression, and the line drawn by the indicator will be a curve going from the atmospheric line up to perhaps one-half of the maximum pressure at the end of the stroke. This curve is usually called an adiabatic curve, since it is assumed that the heat generated by the compression remains in the gas. At the end of this adiabatic the explosion or ignition of the mixture takes place, in consequence of which the pressure suddenly rises to its maximum, and the line described by the indicator will be almost perpendicular to the atmospheric line. This increase of pressure is due entirely to the heating of the gases, and the amount of heat furnished by the gases determines the height to which the line will rise. This burning is not completly instan-

taneous, but continues during the next stroke of the piston, and is known as nachbrennen, or after-burning.

During the third stroke the curve described usually approximates the adiabatic, but is apt to differ from it very greatly on account of the continued combustion referred to above. At the end of this the exhaust opens, and the pressure falls almost immediately, giving a slight curve. It does not drop quite to the atmospheric line, however, since in the next and last stroke the burnt gases are driven from the cylinder, thus giving a pressure slightly above that of the atmospheric. The cycle is now completed, and the engine is ready to receive a fresh supply of gas, compress and explode it, and reject the burnt products.

Since the suction valve is opened but once in four strokes, it is not so easy a matter to provide for its motion as it is to provide for the motion of a steam valve. It cannot be actuated directly from the crank shaft, for any motion directly derived from this will be repeated every revolution. There have been numerous devices introduced for this, the simplest perhaps being a lay-shaft driven at half the speed of the crank shaft.

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ments being continually made upon it, as well as the probable high efficiency and the small demand for attention, the gas engine seems to have a fair outlook to replace the steam-engine to a large extent not many years in the future. W. M. SAWDON.

WHOLE KAFIR-CORN COMPARED WITH GROUND KAFIR-CORN FOR YOUNG CALVES.

(Press Bulletin No. 114, issued from Department of Dairy Husbandry.)

TWENTY head of young grade Hereford, Shorthorn and Angus calves were purchased by the Kansas Experiment Station during April and May, 1901. The feed of these calves was gradually changed to skim-milk, with what grain they would eat, composed of a mixture of whole and ground Kafir-corn. It was found that the calves would eat the ground Kafir-corn when from ten days to two weeks of age, and would begin to eat the whole Kafir-corn when from three to four weeks old. On June 19, these calves were divided into two lots, as nearly equal as possible, the lot to receive ground Kafir-corn weighing 1570 pounds, or 157 pounds per calf, and the one to receive whole Kafir-corn weighed 1577 pounds, or 157.7 pounds per head. Each lot was fed all the skim-milk, grain and hay the calves would eat without scouring. The roughness for both lots consisted of prairie hay only until the calves were twelve weeks old. Alfalfa was then added gradually, and for a time constituted one-half of the roughness fed, and later supplanted the prairie hay altogether. Fresh water and salt were available at all times.

GROUND KAFIR-CORN LOT.—For the one hundred and twelve days under experiment, these ten calves consumed 14,748 pounds of skim-milk, 1394 pounds of ground Kafir-corn, 2381 pounds of prairie hay, 125 pounds orchard-grass hay, and 6222 pounds alfalfa hay. The total gain of the lot during the experiment was 1580 pounds, or 1.41 pounds daily per calf. With skim-milk at fifteen cents per hundredweight, grain at fifty cents per hundredweight (plus three cents per bushel or six cents per hundredweight for grinding), and hay at $4.00 per ton, the feed cost of raising these calves amounts to $47.37, or $4.73 per head. The cost per hundred pounds of gain is as follows: Skim-milk, $1.40; grain, $0.49; roughness, $1.10; total, $2.99.

WHOLE KAFIR-CORN LOT.—These calves consumed 14,620 pounds of skim-milk, 1641 pounds whole Kafir-corn, 2381 pounds

prairie hay, 125 pounds orchard-grass hay, and 5982 pounds alfalfa hay. The total gain was 1406 pounds, or 1.26 pounds daily per calf. The feed cost amounts to $47.09, or $4.70 per head. The cost per hundred pounds of gain is as follows: Skim-milk, $1.56; grain, $0.58; roughness, $1.20; total, $3.34.

Comparing the two lots it will be noticed that the whole Kafir-corn lot consumed 247 pounds more grain but 240 pounds less of alfalfa hay and made 74 pounds less gain. There were a large number of grains, in the case of the whole Kafir-corn lot, that passed through the calves, undigested. This experiment indicates that better and more economical gains are made from ground Kafir-corn than from the whole grain. Nevertheless, if a man is so situated that he cannot grind his Kafir-corn, very fair gains can be made with the whole seed. Again, it is possible to feed the ground Kafir-corn the first two or three months and then gradually change to the whole. The weekly weights and gains show that the calves receiving whole Kafir-corn gained nearly as well the last five weeks of the experiment as those receiving the ground Kafir-corn. Feed ground Kafir-corn until the calf is three or four months old; then if it is more convenient or economical the whole Kafir-corn may be substituted.

D. H. Otis.

One feature of the entertainment was a visit to the State Agricultural College. This institution has grown with giant strides until now it has nearly 1500 students. Brown county is well represented there by twenty or more students. The efforts of the institution are directed towards furnishing a practical education. In the Dairy Department the students are taught how to feed the cow; what foods produce milk and what fat; how to test the milk to determine its richness, and so on through the various stages until it becomes choice creamery butter. In the shop a general knowledge of tools and their uses and abuses are given. In the Domestic Science Department the girls are taught relative values of foods and how to prepare them skillfully and economically. They are also taught how to sew, mend and patch. These are but a few of the many courses that are given, but they will serve to illustrate the practical character of the instruction given. The time has gone by when the Kansan needs to send his sons and daughters away to be educated. Our State Agricultural College is the best of its kind, and every loyal Kansan should be proud of it.—*Kansas Democrat.*

THE INDUSTRIALIST.

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Manhattan, Kansas.

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LOCAL NOTES.

Nearly all the catalogue matter has gone to the State printer.

Born, to Capt. and Mrs. Ralph Harrison, Fort Meyer, Va., a daughter.

Doctor Mayo was called to Tribune on Tuesday on State sanitary work.

The Creamery Department is building a new refrigerator, measuring 8×8×10 feet, for storing butter.

Hon. Geo. Martin, secretary of the State Historical Society, was a welcome visitor at the College last Friday morning.

Engineer J. Lund is placing a new two hundred-gallon tank in the basement of the girls' gymnasium, to furnish hot water for the bath rooms.

The contractor of the new addition to the Library has already completed the work of excavating and is busy laying the concrete foundations. Mr. Schubert is a hustler.

The basket-ball game played last Saturday afternoon in the gymnasium, between the first-year girls and the ladies of the Faculty, resulted in a decided victory for the girls.

The graduating exercises of the Manhattan schools will be held at Wareham's opera-house, May 22. The class numbers forty-one candidates—sixteen boys and twenty-five girls.

Posters are out announcing a "May lunch" to be given by the Y. W. C. A. girls, at Domestic Science Hall on May 15, from 5:30 to 7:30 P. M. Everybody is invited. Price of lunch, twenty cents.

A number of electrical engineering students, under the direction of Professor Hartman, are preparing some coils for the purpose of testing the hysteresis losses in the various kinds of iron.

The Secretary and her assistants are busy preparing the list of students who attended College during the present College year, for publication in the annual catalogue. We may be able to give the figures by terms and classes in our next issue.

The annual conference of the Congregational church of Kansas met at Manhattan last week, and many of the delegates took advantage of the opportunity to visit the College. There was probably a hundred stranger on the campus on Saturday morning, many attending chapel exercises.

Contractors C. A. Fellows and J. W. Berry, of the new Physical-Science Hall, were here on Wednesday, looking after the progress of their work. Architect Haskell, of Lawrence, was also here one day.

Mr. J. Hedke, of Hanover, Washington county, was here last week for several days to look over our orchards, vineyards and gardens and to learn of new methods in orcharding. Mr. Hedke has a large fruit farm near Hanover.

Proofreader Carruth, of the State printer's office, Topeka, was a welcome visitor at the Printing Department on Saturday last. Mr. Carruth and Superintendent Rickman were associate workmen in the State printery for several years.

President Nichols was at the Hays Experiment Station on Sunday, Monday and Tuesday of last week. He reports the work of the Station as progressing satisfactorily, but all the cultivated plats in need of rain. It seems that the rains of last week extended but little beyond Salina.

Ex-Regent C. B. Daughters moved his family here and they are being installed in their new home, known as the Old Williston Homestead. The College is the especial attraction. Mr. Daughters will spend much of his time at their old home, Lincoln, Kan., where he has large property interests.—*Nationalist.*

The Horticultural Department is rebuilding the walks north of Main Building, with branch walks to the Gymnasium, the new Physical-Science Building, and Agricultural Hall. The new walks will be wider and more direct than the old have been. All walks are being constructed of cinders, with brick rims.

The INDUSTRIALIST of last week forgot to mention a happy social event—the entertainment of the Faculty and their wives, on Tuesday evening, by Doctor and Mrs. Mayo, at the handsome residence of the hosts. The program of the evening consisted of social chats, music, literary puns and light refreshments, and all the guests report a very good time.

Professor Otis was at Hill City on Monday of last week to inspect the Pomeroy model farm, near that city. This farm is tilled according to the so-called Campbell method, which is undoubtedly well known to all of our readers. The professor brought back with him a number of very interesting specimens of wheat and tree growths produced by the Campbell system.

Lieut. W. A. Cavenaugh, Twentieth United States Infantry, now stationed at Fort Sheridan, Ill., writes Doctor Mayo that he expects to be here commencement and attend the triennial reunion. He reports a tedious trip of thirty-nine days from Manila, during which the transport was disabled twelve times, and after reaching San Francisco their things were so thoroughly disinfected that most of them were spoiled. He is thankful to be back in "the States" again.

During the past month the College creamery has received 58,299 pounds of milk, costing $570.01 and yielding 2280 pounds of butter fat. This milk was furnished by thirty-six patrons. The highest receipt was $7.42 per cow; the lowest $2.18. This valuation was obtained by valuing butter fat at twenty-five cents and skim-milk at fifteen cents a hundred pounds. The largest check for milk went to B. B. Bayles, amounting to $36.67; the second went to G. R. Bell, and the third to Porter Westgate. A large number of patrons received over twenty dollars each.

During the past four months the College has prepared and sold about $4,700 worth of prairie-dog poison and orders for more are still pouring in from all parts of the West. From fifteen to sixty cans are going out every day. The mixture prepared by Prof. D. E. Lantz seems to be perfectly satisfactory. Had the poison sold up to date been prepared by individual farmers at current drug prices instead of our wholesale prices obtained from large eastern factories, it would have cost the State over $12,000, not counting the labor of preparing it, the danger of mixing it, the probability of getting the wrong proportions of the ingredients, and the possibility of getting inferior materials.

The seniors are working at their theses with commendable energy. A majority of the selected subjects require original drawings, diagrams, blue-prints, surveys, microscopic work, photographs, etc., which consume much time and require persistent effort. Among the selected subjects are the following: A railroad connecting the College with the Union Pacific depot; The prairie-dog and its extermination; A new Horticultural Building for the Kansas State Agricultural College; The coal measures and coal veins of Kansas; Forestry in Kansas; Poultry raising on a commercial scale; Home grounds; etc. We are glad to see that so many of the students have selected subjects of a scientific and practical character.

ALUMNI AND FORMER STUDENTS.

Miss Phoebe Turner, '94, was a visitor at College. She has been teaching, and is now planning a graduate course.

Ralph E. McDowell [student in 1888], who was recently appointed a second lieutenant in the regular army, has been assigned to the Twelfth Cavalry and ordered to join his regiment, now stationed at Houston, Tex.—*Mercury.*

Dr. S. W. Williston ['72], professor of historical geology and vertebrate anatomy at the University of Kansas, has decided to accept a similar chair at the University of Chicago, at a salary of $3,500 a year. Doctor Williston has had the offer under consideration for some time, and has made considerable investigation of the proposed change, and his decision to go to Chicago is no surprise to his friends here. Doctor Williston is one of the strong members of the Kansas faculty and has a reputation the country over in his line of work.—*Topeka Herald.*

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KANSAS STATE AGRICULTURAL COLLEGE

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EDITOR-IN-CHIEF, PRES. E. R. NICHOLS
LOCAL EDITOR, PROF. J. D. WALTERS
ALUMNI EDITOR, PROF. J. T. WILLARD

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THE INDUSTRIALIST.

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THE ATTITUDE TOWARD BOTANY.

IT IS a regrettable fact that the science of botany, whether regarded from its pedigogical or from its investigative side, has moved so far in the rear of zoölogy in the United States that until recently zoölogists, and quite properly, have claimed sole right and title to the generic name "biology" as designating their side of the study of life. Botany has become a living, a biological science in America only within very recent years. It is recognized to-day, to be sure, that a botanist must be something more than the man "who knows plants;" that botany is something more than the work of accumulating a number of flowering plants in a dried condition for an herbarium.

Botanists may as well be frank in the matter, however, and admit that a large measure of good-natured contempt for their "science" has been accorded by mathematicians, physicists, and zoölogists, who saw in the operations of the professional botanist nothing approximating to the exact study of fundamental principles. This is partly because of the fact that in the case of botany, as of no other science, it is possible for a vast number of pottering hobbyists and dilettant amateurs to meddle prominently in the subject-matter of the science—the plants, make themselves conpicuous by certain phases of activity, and get themselves confused in the minds of the general public with the scientific investigators of the functional activities and morphological relationships of the members of the plant kingdom. To the man on the street, and even to many a zoölogist, chemist, and physicist, the wiseacre of the woods, who is the compiler of a local flora of Jones county, Texas, and a Sachs, a Strasburger, or a Pfeffer, are alike "botanists" both in kind and in degree.

Plainly, then, let us admit that the idea has been and perhaps still is very generally abroad, that the business of a botanist is the innocuous and mildly relaxing pursuit of "collecting plants," and that the measure of distinction and success which are his, as

estimated by the standards of his professional compeers, is the number of species included in his herbarium. Let us admit further, that to the mind of the thoroughgoing, strong man, engaged in doing something requiring strenuous mental effort, the study of botany has usually presented itself as an appropriate and at all events a harmless pastime for young ladies of high-school age, but scarcely worth a moment's serious consideration as a subject worthy of dignified contemplation by advanced men. If all this be true, and almost no professional botanist exists who has not been brought into contact with this point of view, and that right frequently, what reason must be sought to explain it?

The study of plants in many phases of their life and activity formed a large portion of the labors of Charles Darwin, a serious and strenuous man of science, if ever there lived one. The development of his evolutional theory found its basis no less in his study of the performances of plants than of animals. The occupation of the larger portion of the dwellers on the globe is directly and that of all the rest of mankind indirectly dependent upon agriculture, which is simply the business of growing plants and selling them. And the greater success of agriculture depends chiefly upon the extent and intimacy of man's knowledge of the life of plants. Surely a field of study in which Darwin could seriously participate, and having such immediate practical bearing upon the lives and fortunes of mankind, must find its basis in the fundamental things of nature, not to be lightly regarded by anyone. And yet, as we all know, botany has been, and still is, to a considerable extent, lightly and scoffingly taken even by those who should know better and think more wisely. The reason? It is not far to seek. We find it not merely in the discredit which attaches to a subject in whose investigations any untrained pedestrian with a collecting can may apparently participate, but likewise and more pertinently in the point of view of the botanists themselves, and in their treatment of the subject-matter of their science in the lecture-room and in the laboratory.

It is safe to say that the systematic side of botany—the determination of species—has been the main object of study by botanists in America up to within recent years. Since species work has been their chief interest, it is but natural that their teaching of botany should reveal this fact. The determination of species, to be worth anything, depends upon the comparative examination

of many specimens of the supposed species. This means collecting, and much of it. What is more natural, where others are taught by one thus engaged, than that he should teach them to go and do the same thing. Hence every school-boy has his "herbarium" of some dozens of hastily snatched, badly mounted specimens of plants—flowering plants, of course—dubiously named by misspelled labels, mounted on paper and called a "collection." It is safe to say that work of this character, as usually pursued by an elementary student, bears about the same relation to the study of plants as does the collecting of postage stamps to the study of geography, or the sewing of pious mottoes on cardboard to ethical culture.

The fatal facility with which plants can be made to endure desiccation and still present in their mortuary remains some semblance of the living organisms they once were has led to the vast development of the "herbarium spirit" in the botanical world, and has evolved that queerest of all odd creatures—the man who spends his days manufacturing species pigeon-holes into which to thrust the infinitely variable living plants, by the process of comparing his petty handfuls of dried specimens, whole or fragmentary, whose organs have previously been reduced by pressure as nearly as possible to a state of two dimensions in space, and which are necessarily studied wholly apart from their natural environment, so tremendously important for the light it sheds upon the life and activities of organisms and for the explanation it affords in so many cases for differences existing among them.

Such a person is the "herbarium botanist," a person whose counterpart can scarcely be said to exist in zoölogy, because the expense of preparing animals for examination in a future state of preservation is so great as to work strongly against a large accumulation of animal material. The zoölogist, therefore, is of necessity a man who deals chiefly with living or recently killed organisms. This naturally has effected his habit of mind and has brought about his usually keener appreciation of the higher value of the study of living things. The result is that the zoölogist has always seemed to strive more earnestly to bring his students into contact with the life phenomena of animals than has the botanist to make apparent to his students the dynamic aspects of plants. To do this has been the easier, of course, for the reason that the motor activities of animals are relatively more striking than those

of plants, and perhaps thereby more readily attract the attention and interest of the average student. Animals, moreover, even if preserved in alcohol or formalin, do not differ so widely from their appearance in a living state as dried plants on herbarium sheets differ from the same plants in swamp, forest, heath, or desert.

This is not to say that in the American botanical laboratories it has not generally been the custom to study living plants. It is quite true that they have always been generally studied in most well-developed courses of botany, although the cases are numerous enough where the only supplement to the class-room work was the collection of an herbarium, as already alluded to. But the systematic and floristic habit of mind of the average teacher of botany, if he supplemented his lectures or text-book teaching with laboratory work, has been to make the laboratory exercises consist largely of the identification of species by means of the "key," the business known the country over as "plant analysis." And because the "flowering" plants are those which can most easily be examined by the eye and with simple lenses, laboratory work in botany—plant analysis—has come to connote in the minds of most educated persons of mature age to-day the identification of local wild species of flowering plants.

What was the text-book in botany which has chiefly represented and to some extent still represents the standard basis of instruction in elementary botany in American class rooms? The text of Gray. There is no other answer. The rigid attitude toward nature, which is the most prominent characteristic of the systematic botanist of the old school, the disproportionate emphasis laid upon the "flowering" plants, when the inadequate information given concerning the lower forms is considered, and the grand culmination of all plant work in the identification of species by means of a key, are all perfectly illustrated in Gray's "Elements of Botany," the text which has dominated and shaped botanical teaching in this country as, it is safe to say, no single text has ever dominated or shaped the teaching of zoölogy in any country.

What was the stamp which this text-book gave to the teaching of botany? In the first place it foisted upon the pupil the conception of a "pattern plant" (the flax in this case), imposing immediately upon the learner the necessity of conceiving of plants as being first of all "flowering" plants, all the rest of the plant world being tacitly understood by him to be unfortunate exceptions

which somehow do not come up to the standard set by the "pattern." Now it so happens that the Linaceæ, to which the flax belongs, do not represent the highest evolutionary product, even among flowering plants, by any manner of means. The flowers of the flax are hypogynous, actinomorphic, and polypetalous, which are low-grade characters in floral evolution; the partially syncarpous megasporophylls being perhaps the chief suggestion of a high tendency. And yet this plant was selected as the "pattern" plant because, to use the old terminology, it was "regular" (actinomorphic), "perfect" (disporangiate, possessing both stamens and carpels), and "complete" (having present both sets of floral leaves and of sporophylls). And this purely formal regularity in the exterior parts of the flower was the ideal set before the beginning student's mind as the goal toward which the study of botany, if not the evolutionary development of the plants themselves, was headed.

Having fixed upon a "typical plant" thus arbitrarily chosen from among a lower group of dicotyledonous angiosperms, the highest, most complex and most recently developed grand division of the plant kingdom, the student was invited to consider that plant literally "from the ground up," by beginning with the lowest part, gravitationally speaking, "the root," whence, moving away from the center of the earth, he successively reached in his outward and upward course "the stem," "the leaf," and, finally, "the flower."

Gray says (preface to Elements of Botany, revised edition, 1887) that the book is "intended to ground the beginner in structural botany and the principles of vegetable life, mainly as concerns flowering or phanerogamous plants, with which botanical instruction should always begin; also to be a companion and interpreter to the manuals and floras by which the student treads his flowery way (sic) to a clear knowledge of the surrounding vegetable creation."

This seemed for years consistent and reasonable enough to a host of botanists. Let us paraphrase the sentence and suppose it to have appeared in 1887, in a preface to an elementary zoölogy, thus: "It is intended to ground beginners in structural zoölogy and the principles of animal life, mainly as concerns mammalian, or vertebratous animals, with which zoölogical instruction should always begin; also to be a companion and interpreter to the

manuals and faunas by which the student threads his furry (or feathery) way to a clear knowledge of the surrounding animal creation." Since the days of Goldsmith's "Animated Nature" nothing like this has decorated the front pages of zoölogies, and a text-book thus introduced to the zoölogical public in 1887 would have been derided into oblivion.

Let us carry the idea of treatment suggested by the paraphrase into practice. Let us suppose a student in zoölogy to have begun his work after the fashion in which nine-tenths of his botanical brethren were introduced to theirs in 1887. Let us select as a "pattern" animal the cat. The student would accordingly begin by the examination of the lowest portion of the animal, the claws. Whence, proceeding to the musculature and skeletal structure of the furry appendages, he would reach the trunk and its included organs, arriving at last at the vertebral column, and concluding, doubtless, with a consideration of the cranium and the central nervous system. In defense, it might be urged by the old-style botanist that the phanerogams or angiosperms are the plants of common life, easily obtained by every one and easily examined. By the same token the cat is an animal of common life, easily obtained by every one and easily examined.

Is this method of procedure in zoölogy one whit more absurd from the biological standpoint than the analogous method of attacking plants? What respectable zoölogical writer was ever heard to speak of a "pattern animal," and yet Gray informs us that "phanerogams, or flowering plants, are all constructed on one plan or type;" hydrophytes, xerophytes; lianas, tree forms, herbs; orchids, ranunculus forms, legumes, campanulas, euphorbias, cacti, solanums, crucifers, composites—all "constructed on one plan or type." And so throughout this book, the incubus of which has borne so heavily upon our teaching of botany for so many years, the idea of the "type" or "pattern" in the plant world is carried. All of the organs of the "pattern plants" are stiffly, formally and elaborately classified according to location, form or dimensions. Not only must leaves as a whole be linear, lanceolate, oblong, elliptical, oval, ovate, orbicular, oblanciolate, spatulate, obovate, or cuneate, but their bases must be cordate, sagittate, hastate, or peltate, their apices be acuminate, acute, obtuse, truncate, retuse, emarginate, obcordate, cuspidate, mucronate, or aristate, and their margins entire, serrate, dentate,

crenate, repand, or sinuate, incised, lobed, cleft, parted or divided, and so on through all the dreary terminology of this pseudo-morphology, with accompanying wood-cuts, drearier and more dismal still.

In addition to being a mere dictionary of definitions of the external structure of the flowering plants for one hundred ten of its one hundred eighty-nine pages, the lower plant groups—the thallophytes, bryophytes, pteridophytes—vast assemblages of the most tremendous significance from the standpoint of comparative morphology, and through which the line of evolution is followed to the flowering plants by a chain of connecting links far more perfect than any animal series presents; all these are tossed off in a sort of an "anhang" of eighteen pages, a chapter entitled "Cryptogamous, or Flowerless Plants." Poor, unfortunate plants these were, not possessing the main object of all botanical study, the flower. As one were to close one's study of zoölogy with a brief consideration of the arthropoda, vermes, mollusca, echinodermata, coelenterata and protozoa under the designation "non-vertebratous animals," incidentally to be considered because they happen to exist, not as having any evolutionary significance whatever. The "higher orders" of cryptogamous plants, "such as ferns," says Gray, "can be determined almost as readily as phanerogamous plants," so it is revealed that the prime object of the study of these, as of the other forms, by the beginning student is to "determine" them by means of the usual "key."

Add to all this the fact that no slightest inkling of relationships among the groups was given; no respectable consideration of the influence of environment on plants, or of their marvelous ecological adaptations; nothing of the striking phenomena of distribution as affected by the struggle for existence; of morphology in the scientific modern sense, nothing at all; of the evolutionary history of the plant kingdom, absolutely nothing.

Whereas nature shows us only unconformity, variability and plasticity in organisms, the majority of our secondary students of botany have had implanted in their minds, through the medium of this book, conceptions of uniformity and immobility in the structures of living plants. Adherence to type or pattern in organic life has been emphasized, whereas nature never deals in types, but in infinitely varying and constantly diverging individual forms.

In this mould the secondary and to no inconsiderable extent the college teaching of botany in America has, until late years, been cast, and to this teaching of the science much of the existing popular misconception concerning the trend and scope of botanical science can fairly be said to be due. Gray's "Elements of Botany," from its nearly universal use as a school text-book up to within very recent years, has had the privilege, accorded to no other single text in any branch of science, of almost completely moulding the whole attitude toward botany in its elementary branches for virtually a generation. It certainly is responsible for having shaped the course of practically all of the American teaching of botany in the last generation, and for having moulded the minds of most of the older teachers of botany now in service, during their earlier and more plastic years. Inasmuch as the average student goes no farther than the elementary course in botany leads him, his conception of the whole subject and his prejudices for or against it during the rest of his natural life will probably be determined by the character of such an elementary course. Is it surprising, then, that a generation of young people have grown up in America, numbers of whom carry with them a deep-rooted dislike to the subject of botany, as the result of this formalized, desiccated and purely floristic treatment of the subject-matter of the science?

There is one other aspect of the subject of botany which should be considered, namely, the feminization of the science which various causes have conspired to produce at sundry times in the past. "How perfectly lovely it must be to be always studying flowers," an eminent professor of botany in a great western university tells us in a recent article, is a common salutation of numerous feminine visitors to his laboratory. That the idea somehow keeps abroad that botany is the "study of flowers" and therefore, to that extent at least, "perfectly lovely," is a sufficiently familiar cause of inward ire and mortification to professional botanists to-day. What shall we say, however, when we find even a botanist occupying a somewhat similar attitude toward this subject? Within the latter half of the century just passed Lindley published, in England, his "Ladies' Botany," wherein we are informed by the author that "the study of botany is especially adapted to the female mind." This statement can hardly be taken as a compliment to the masculine members of society when

one considers the pursuits of a wholly decorative character with which Lindley and his co-aevals supposed the "female mind" to be alone capable of coping with success.

It is generally true that boys love animals and girls love flowers. Send a class of school children into the woods, and most of the boys return laden with minnows, clams and cray-fishes from the creek, the eggs or young of birds, pocketfuls of snakes and land tortoises, and an occasional young rabbit or squirrel to be "tamed." The little girls, for the most part, have their baskets filled with ferns and mosses, queer lichens, odd leaves, and all the beautiful flowers that come to their hand.

This differentiation of taste due to the boy's natural liking for the ownership of living things, by which he understands animals only, continues with most people throughout life. It can be corrected, however, in the nature study courses in the graded schools, where the subtler, less obviously startling, but none the less real facts concerning the activities of living plants can be brought before the boy and his interest vividly aroused. It is not usually difficult to interest boys in the growth of plants. It has been, however, notoriously difficult to interest them in a formal catalogue of the names of parts of plants, leading up to—what? Not to the study of life, but to the mere identification of "species."

The "new" botany has come, however, to very many of our secondary schools and colleges. Text-books in considerable number present the subject attractively from various points of view. The German spirit of research has vivified the upper reaches of botanical work, and the generation of young people now being trained will for the most part conceive of botany as a forceful, virile discipline, bringing one into contact with a most interesting set of organisms, in which the activities of the living protoplasm are as notable and significant as they are seen to be in the world of animals.

H. F. ROBERTS.

The seniors in the Mechanical Engineering Department are hustlers. Every one of them has secured a position for work immediately after Commencement. M. S. Cole goes to Cincinnati, Ohio, to work for the American Tool Company. The others will probably work in the Santa Fe shops, where progressive jobs at fair wages have been offered them.

SECOND REPORT ON COW TEST EXPERIMENT.

THE record of the nine cows for March was published in the INDUSTRIALIST for April 22. The April record is as follows:

No. of cow	Name of Cow.	Selected by	Fresh	Yield. Milk, pounds	Test, per cent	Butter fat, pounds	Grain consumed, bran.	Judges' rank for profit.
243	Cowslip	J. W. Bigger	Nov. 3,'01	762.1	4.20	32.00	240.0	3
236	Haster	E. C. Cowles	Dec. 16,'01	743.7	3.90	29.00	240.0	1
244	Rose of Cunningham	J. W. Cunningham,	Jan. 28,'02	1090.1	3.30	35.97	266.5	2
238	Clover Leaf	M. L. Dickson	Jan. 12,'02	642.9	3.15	20.25	153.5	7
245	Molly	A. H. Diehl	Jan. 20,'02	726.8	3.35	24.34	180.0	5
241	Rose of Industry	C. Elssaser	Jan. 15,'02	791.5	3.40	26.91	180.0	8
240	Daisy Bell	S. A. Johnson	May, '02	......	......	......	......	9
246	Floss	C. C. Lewis	Oct'br, '01	477.0	5.25	25.04	180.0	6
242	May Queen	G. W. Priest	Dec. 25,'01	582.8	5.05	29.43	240.0	4

Each animal consumed the same amount of roughness during the month, as follows: Alfalfa, 823 pounds; Kafir-corn fodder, 37 pounds; soy-bean hay, 87 pounds; total 947 pounds.

TOTAL RECORD FOR MARCH AND APRIL, 1902.

No. of cow	Name of Cow.	Yield. March. Milk, lbs	March. Butter fat, lbs	April. Milk, lbs	April. Butter fat, lbs	Total. Milk, lbs	Total. Butter fat, lbs	Grain consumed	Roughness consumed,
243	Cowslip	761.6	33.89	762.1	32.00	1523.7	65.89	462.5	2011
236	Haster	849.5	32.28	743.7	29.00	1593.7	61.28	488.0	2011
244	Rose of Cunningham	1200.1	36.00	1090.1	35.97	2290.2	71.97	488.0	2011
238	Clover Leaf	733.1	21.62	642.9	20.25	1376.0	41.87	372.5	2011
245	Molly	824.0	25.95	726.8	24.34	1550.8	50.29	391.5	2011
241	Rose of Industry	802.0	25.27	791.5	26.91	1593.5	52.18	391.5	2011
240	Daisy Bell	......	......	......	......	......	......	......	2011
246	Floss	503.6	25.68	477.0	25.04	980.6	50.72	378.5	2011
242	May Queen	630.3	30.88	582.8	29.43	1213.1	60.31	462.5	2011

It will be noticed that the grain for some of the cows was reduced and for others it was increased. This was to correspond more closely with the production of butter fat. The roughness consumed was reduced about seventy pounds per head from last month. In breeding these cows the aim has been to have them freshen as near as possible one year from date of last calving. May Queen, containing a large percentage of Jersey blood, was bred, April 25, to our Jersey bull, Brown Elsie's Grandson 60412. Rose of Cunningham, being a grade Holstein-Friesian, was bred, April 27, to the bull of that breed, College Emperor 28751.

D. H. OTIS.

About one hundred members of the Kansas City Commercial Club visited Manhattan from 7 to 9 A. M. Monday. They had left Kansas City on Sunday evening, and are on a tour of the State. Their first stop was Manhattan. They are traveling with a special train made up of four sleeping-cars, an observation- and dining-car, and two baggage-cars. The train is equipped with a telephone exchange between cars, and is so arranged that at any town where there is a long-distance line the members may sit in their car and communicate with their business houses or homes in Kansas City. Their route takes them over the Rock Island to Limon, Colo., back over the Union Pacific to Kanopolis, south via the Missouri Pacific to Sterling, thence over the Santa Fe to Hutchinson, Medicine Lodge and Kiowa into Oklahoma, and back through Argonia, Wellington, El Dorado, Florence, and Emporia, where they transfer to the M. K. & T., going through Burlington, Humboldt, Parsons and Paola back to Kansas City. The time occupied in taking the trip is from Sunday evening, May 18, to the following Saturday night.

The mid-term examinations and the usual excitement produced by this event are over and the classes are working on the last five-weeks period of the College year. There have been the usual number of failures and poor grades and the usual number of necessary readjustments of work. A few of the poorest students received the fatherly advice of the Faculty to go home and work in the corn field for awhile. A large corn patch or a steam thresher are sometimes the very best means to arouse the latent energy of a young farmer who is apt to get too dreamy or too gay over the various 'ologies and 'ics of a college course.

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

President Nichols will deliver the Decoration Day address at Wabaunsee.

The Farm and Dairy Departments have just turned their stock out on pasture.

The rubble work of the basement of the Library annex is nearly completed.

One of the late attractive additions to the Farm Department is a lot Tamworth-Poland China pigs.

Over two inches of rain fell at the College last Wednesday. It was a glorious and much-needed drenching.

The College creamery has received forty-three thousand pounds of milk during the first half of May.

The Dairy Department has purchased thirty calves to continue experiments in feeding skim-milk and buttermilk.

The Dairy Department received two requests for expert butter makers last week. Only one of them could be filled.

Chas. A. Strong, superintendent of the Ellis schools, will conduct the Riley county normal institute this summer.

The water-works system has been extended to the pasture north of the dairy barn, to provide water for the pure-blood stock.

The farmers' institute department has received ten cuts of live stock to be used in illustrating the institute posters for next year.

Prof. A. E. Davisson, of the department of agriculture of Nebraska State University, was an interested visitor on Monday and Tuesday of last week.

The agricultural library has been the recipient of nine volumes of the Canada Ayrshire Herd Record, which are to be used by the students in stock judging and breeds and breeding.

Mr. V. M. Emmert, '01, was renewing acquaintances around College between trains last Friday morning. He was on his way home from the Sunday-school convention at Salina.

Last week the Farm Department was the recipient of a large crayon-work likeness of Sec. F. D. Coburn. This picture was presented by the Progressive Farmers' Club of 1902.

The class in agricultural economics are planning a dairy barn, to hold one hundred dairy cows, for Professor Cottrell. The barn is to be erected on the large farm that he is to superintend.

Professor McKeever, of the Kansas State Agricultural College, lectured at Onaga to a large and appreciative audience Sunday evening. The different churches held a union service for the occasion.

The Farm Department is fitting up a room in the northwest corner of the barn for Lyman J. Coffman. This will enable Mr. Coffman to be where he can have constant care of our fine Percheron mares and colts.

As in former years, Manhattan will celebrate Memorial Day with a sermon, a procession to the cemetary, and a program of exercises in the auditorium. A full program will be published in the next INDUSTRIALIST.

The K. S. A. C. baseball team met defeat Saturday at the hands of the Nebraska University team. The home team played fast ball during the entire game except two innings, when they allowed the visitors to cross the home plate six times during each inning.

The graduating exercises of the Manhattan high school will be held Thursday evening, May 22. The class numbers forty-one candidates. Tickets for the exercises will be on sale at Willard's drug store Wednesday evening at 4:30. Admission, fifteen cents; gallery, ten cents.

The young ladies of the Y. W. C. A. gave a delightful "May lunch" last Saturday afternoon, in Domestic Science Hall, from 5:30 to 7:30. The affair was a social success and netted the young ladies a neat little surplus. It is estimated that about two hundred seventy-five plates were laid.

The College battalion had its annual inspection on Wednesday afternoon. The inspecting officer detailed by the War Department was Capt. James B. Erwin, of the Fourth United States Cavalry. He expressed himself greatly pleased with the bearing and general proficiency of the boys.

Miss Myrtle Mather, of the present senior class, has been elected teacher of domestic science in the State Industrial School for Girls, at Beloit, Kan. Miss Mather will leave for her new position about June 1, but will return on Commencement, June 19, to get her B. S. sheepskin with the class of '02.

The new traction engine, which was built for the College in Minneapolis, Minn., was received last week and is now being worked and piloted every day by the students of the farmers' and engineering courses. On one side of the car was a banner, which bore the following advice to the farm boys: "Boys, be good to Minnie and she will be good to you." On the other side the banner read: "This engine goes to the Kansas State Agricultural College."

Miss Minnie A. N. Stoner, formerly professor of domestic science at this College, writes to Professor Walters, from Columbus, Ohio, where she is teaching: "I am delighted with my work and have a fine position. Ohio is an excellent field in which to work. I have reorganized the department and changed the course of study, and have succeeded in making several excellent improvements. I expect to go East this year early in June and visit institutions of domestic science. On the 24th of May I expect to be in Chicago to attend the National Household Economic Association executive committee, of which I am a member. We are intending to plan the program for the convention next fall and the plan of work for the year, and with my department work I am therefore very busy. I wish you success in your work, and hope that the College will have great prosperity in the future, as it has in the past."

Tuesday morning the editors were taken through the Kansas State Agricultural College and were shown through all its departments. This institution is one in which every Kansan should be interested and one that the editors, many of whom had never seen its buildings and workings, were proud of after making an inspection. Space here forbids a detail of the trip through the College, but some of its main points must be mentioned. To begin the program, a military drill was given by the students and the movements were all executed with regular army precision. There are eleven buildings in all. The visitors started from the main hall, in which over a thousand students took part in the chapel exercises. From this building they were taken to the dairy building. Nearly one hundred fifty students were in this building at work separating and testing milk, making it into butter and cheese, and here the results from experimental feeding were ascertained. Then came the floricultural department, where all sorts of plant life are found and where the students get at things in their natural state. Then there were the industrial buildings, where the boys are taught carpentering, blacksmithing, machine work, molding, printing, etc. There is a building where the young ladies are taught sewing and cooking. In the main building are the study rooms and class rooms. The library building is a fine one and the library is one in which a large number of volumes of valuable information are stored. In the same building is the museum of animals, birds, etc., which is quite complete and was a place of much interest to the visitors. These buildings are all built of native stone and the scene they present as one approaches the campus is a beautiful one. The institution has an attendance of over 1300, mostly Kansas boys and girls; the studies embrace almost everything but law and medicine; it is used by the government as an experimental station, and receives appropriations from both the State and Nation. We would advise anyone who thinks of visiting the institution to put in several days; the short time given the editors in their inspection, while it gave them an idea of its vast scope, was unsatisfactory from the fact that not enough of the detail could be investigated. —*Robinson Index.*

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THE INDUSTRIALIST

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Local Editor,	PROF. J. D. WALTERS
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THE INDUSTRIALIST.

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GROWING WHEAT UNDER THE CAMPBELL METHOD.

WHEAT CONDITIONS IN CENTRAL KANSAS.—Since the resignation of Prof. H. M. Cottrell, the writer has had charge of the field work on the farm of the College and Experiment Station. Hearing that the wheat had been severely injured in the western part of the State, while that grown under the Campbell system on the Pomeroy model farm in Graham county was looking fine, the writer made an investigating trip.

A short visit was made in Saline county just after the recent rain, May 5, consulting farmers, bankers, wheat buyers, and others who were posted on the wheat situation. These men estimated that fifty to sixty per cent of the wheat had been injured by the dry weather. No one seemed to know anything about the Campbell method of soil culture, although nearly all expressed themselves favorable to early plowing and good harrowing. As far as information could be gathered, no harrowing was done after the wheat was up, although one man said that before coming to Saline county he had harrowed his wheat in the eastern part of the State for the purpose of covering clover seed, and as a result secured ten bushels per acre greater yield than he obtained on adjoining land not harrowed.

Traveling northwest from Saline county, through Ottawa, Lincoln, Russell, Osborne, Rooks and Graham counties, the wheat looked very poor until after reaching the center of Rooks county. From there to Hill City, Graham county, the wheat had a much better appearance and the growers estimated the loss by dry weather from twenty-five to thirty per cent. Between Salina and Plainville, Rooks county, the wheat, although frequently a good stand, was very short and many fields were being listed to corn, while others were being closely pastured previous to listing. From the middle of Rooks county west, the rains have been more seasonable and the wheat had a better appearance. The volunteer wheat (wheat that springs up from shattered

grains lost in the harvesting of the crop of the previous year), which in favorable conditions makes a fair crop, was nowhere a success and the ground was being used for corn.

WHEAT ON THE POMEROY FARM COMPARED WITH THAT ON SURROUNDING FARMS.—The Pomeroy model farm, which is being tilled under the Campbell system, is located about one and a half miles northwest of Hill City, in the center of Graham county. The writer was taken in charge by Dr. I. B. Parker, a graduate of the Kansas State Agricultural College, and driven fourteen miles south of Hill City to examine a number of wheat fields. Quite a variety of conditions existed. Where there was a good stand of wheat on the bottom or first raise, the growth was short, measuring seven to eight inches, was fairly well stooled, but the lower leaves were turning yellow. Where the stand was thin (one-third to one-half of full stand) the growth was considerable better, measuring twelve to fourteen inches. On the upland the wheat looked poor. Samples taken measured five to six inches in height, but had stooled but little.

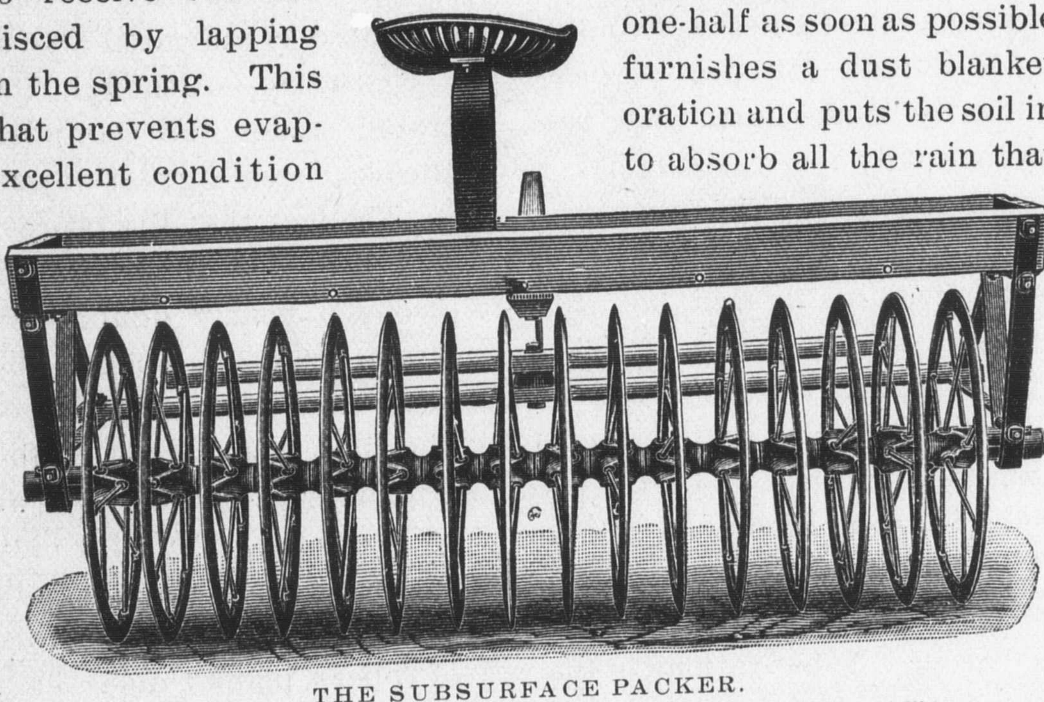
Comparing these fields with those on the Pomeroy farm, the contrast was marvelous. Farmers, merchants and professional men all agree that the Pomeroy model farm is naturally the poorest in the neighborhood; that for ten years before the establishment of the Campbell system the land had been farmed by various parties, but no one was able to grow paying crops. The first wheat field visited was situated on some of the highest land in the county. Several attempts to secure well water on this high land were unsuccessful. The wheat was from twenty to twenty-two inches high, of a uniform stand, and was really too thick for best results. Actual counts showed from eighty to one hundred stalks to the linear foot in the drill row. Individual plants had stooled out until they contained fourteen to sixteen stalks apiece. On top of this was the remarkable statement that the seed had been sown at the rate of only one-half bushel per acre. This field of wheat was by far the best seen on the entire trip.

THE VALUE OF SUMMER FALLOW FOR WHEAT.—Other fields visited on the same farm did not look quite as well but gave every promise of good yields. The reason for this difference was, that the first field had produced no crop the previous year, but was plowed early in the spring and harrowed after every rain until wheat was sown in the fall. With neither crop nor weeds to sap

the moisture, and the soil mulch to prevent loss by evaporation, the soil was well stored with water, which the wheat plant pumped up to excellent advantage. The other fields had grown crops the previous year, one of them yielding thirty-six bushels of wheat to the acre, and the supply of moisture was consequently more limited and the wheat did not grow as rank.

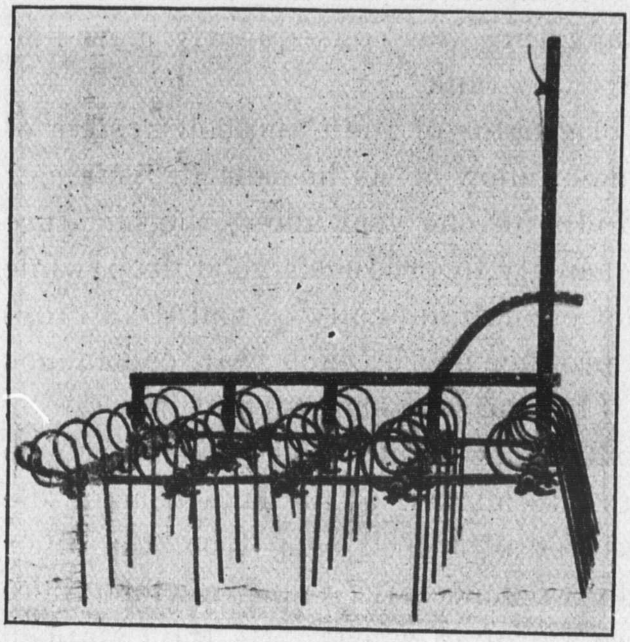
Mr. H. W. Campbell, the originator of the Campbell system of soil culture, advocates summer fallow or, as he calls it, "summer culture." Leaving the land idle for one year allows the moisture to accumulate in sufficient quantity to produce a good crop, while if the rainfall is limited (not enough annually to mature a crop) and an attempt is made to produce a crop each year, continuous failure may be the result. In the western part of the State, where these suggestions would apply, land is comparatively cheap and a farmer could well afford to let half of his land remain idle each year if he could be assured of a good crop from the other half. There are probably no two successive years in which there is not enough rain to mature a crop of wheat. By the Campbell system of clean culture and a soil mulch, practically all of this moisture is stored in the soil. Half the land with plenty of moisture will produce a greater yield of crops than all the land with only half or two-thirds enough moisture.

How the Soil is Prepared and Tilled.—Where the land is to receive summer culture (fallow), it is double disced by lapping one-half as soon as possible in the spring. This furnishes a dust blanket that prevents evaporation and puts the soil in excellent condition to absorb all the rain that



THE SUBSURFACE PACKER.
(Cut loaned by King & Hamilton Company, Manufacturers, Ottawa, Ill.)

falls. As soon as convenient the land is plowed about seven inches deep. Each half-day's plowing is gone over at once with the subsurface packer to displace the air chambers formed in plowing and to make capillary connection with the soil below, and near the close of the day each day's plowing and packing is gone over with the harrow to prevent evaporation of moisture by the formation of a dust blanket. The harrowing is repeated after each heavy rain. After the young wheat plant is well rooted it is gone over with a light harrow or weeder after a heavy rain. This is especially advisable in the spring, when the wheat commences to stool. When the wheat is harvested the ground is gone over the same day, if possible, with a disc harrow for the purpose of producing a dust blanket to conserve the moisture. The ground is then plowed at the earliest convenience and treated as indicated above.

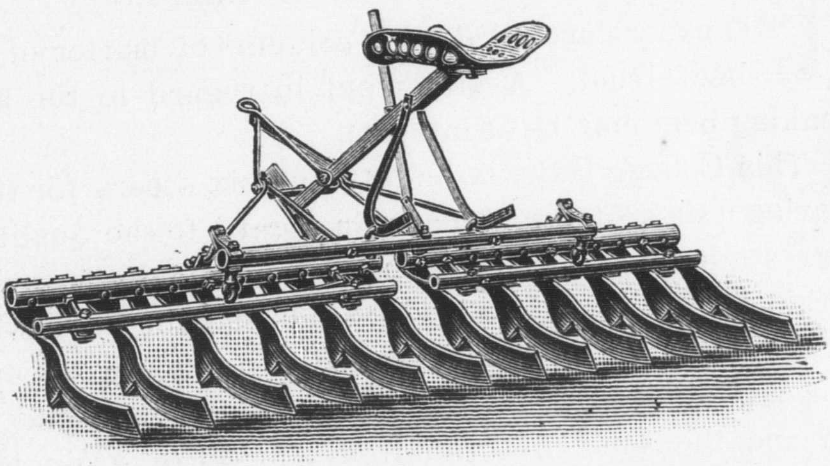


SECTION OF COMBINATION HARROW AND WEEDER.
(Cut loaned by H. W. Campbell, Holdredge, Neb.)

CAMPBELL METHOD ADOPTED BY FARMERS.—Although the Pomeroy model farm has been operated under the Campbell method only two years it has, nevertheless, been a great object-lesson to the surrounding community. The fact that the poorest farm in the vicinity could be taken and with less than half the usual amount of seed be made to produce nearly double the amount of wheat produced by the average farm has opened the eyes of thoughtful farmers. The leading hardware merchant of Hill City told the writer, that after the first year's trial of the Campbell method. and as a result of it, he sold three times as many harrows as he had sold any year previous. Thus far only two or three subsurface packers have been sold; the farmers have been waiting to be absolutely sure they were essential before investing. Substitutions in the way of rollers, planks, discs, etc., have been used for firming the soil. Frequently the discs are ar-

ranged with the concave faces together, forming a sort of wheel. While the various arrangements do not equal the subsurface packer, they will point to its value. Wheat farmers are practically a unit on the necessity of firming the seed bed for wheat, and in a few years the subsurface packer will undoubtedly be used extensively. The farmers around Hill City are also convinced that frequent harrowing is necessary for best success, and many of them are even harrowing their wheat in the spring when it is four to six inches high. Mr. Campbell finds that packing the soil keeps it from drifting with the winds.

THE SAME PRINCIPLES APPLIED TO OTHER CROPS.—Oats, a scarce article in the western part of the State, were looking fine on the Pomeroy farm. The corn had just been listed. Inquiry revealed the fact that even during last summer's dry spell the corn plants made a good growth under the Campbell system, and were it not for the dry, hot winds that dried up the tassel and pollen in spite of there being plenty of moisture in the soil, a good yield would have been obtained. The orchard on the Pomeroy farm would be a beautiful sight in any country. It is situated on high land and has a southern slope, but in spite of its poor location these trees, which have been set out two years, show a good, thrifty growth. The soil is gone over after each rain with an Acme harrow; not a weed is to be seen. Compared with trees of the same age planted in the court-house yard, about a mile distant and on lower ground, they have made a growth of eight inches in trunk circumference while the court-house trees measure only four inches in circumference. The latter were given ordinary treatment, and in addition were extensively irrigated. The maple trees on the Pomeroy farm show a growth of twenty-four to twenty-six inches in the



THE ACME PULVERIZER HARROW.
(Cut loaned by Duane H. Nash, manufacturer, Millington, N. J.)

terminal limbs while the court-yard trees show only eight to nine inches. The same comparison with the elm trees shows twenty-five to twenty-seven inches for the Pomeroy farm and only ten to twelve for the court-yard. The trees on the Pomeroy farm are thrifty, while many of those in the court-yard are dying.

SUGGESTIONS FOR WHEAT GROWERS.—It is hard to appreciate the full value of the Campbell method of soil culture without visiting the Pomeroy model farm, but after the visit is made there is no question about its value. The wheat farmers who have suffered loss from the lack of sufficient moisture, or who are likely to suffer from this cause, will do well to study into the system and as far as possible guard against future losses. Disc the soil immediately after harvest, if possible the next day, and plow at the earliest convenience. If it is possible to secure a subsurface packer, Mr. Campbell recommends plowing seven inches deep; without a subsurface packer the plowing should be four to five inches deep. The depth of plowing, of course, will vary considerably with the depth of the soil and subsoil. After plowing, pack the soil and follow with harrow to secure dust mulch. Harrow after every rain until seed time, and the much-needed moisture will be stored up for the succeeding crop. Maintain the soil mulch by harrowing after the wheat is well rooted. D. H. OTIS.

THE COST OF BEEF.

THE papers are filled with columns of matter in regard to the beef trust. A statement in regard to the actual cost of making beef may be of interest.

This College last winter fattened six steers for the purpose of having a slaughter test made, in regard to the quality in beef, for our students. It required nine hundred forty-seven pounds of grain for each one hundred pounds of gain made while fattening these steers. The usual average is one thousand pounds of grain for one hundred pounds of gain and one thousand two hundred to one thousand five hundred pounds of grain is not uncommon. This shows that these steers were fattened with less grain than is used by the average feeder. The grain was purchased in Manhattan at current market prices.

At the close of the feeding Mr. George Washington, Manhattan, an extensive feeder and shipper, estimated the market value of each steer. Mr. John Gosling, Kansas City, and Mr. Charles

Anthony, head cutter for A. Weber, leading retail butcher of Kansas City, estimated the wholesale selling price of the dressed carcasses at Kansas City. The cost per hundred pounds and the valuations made on the finished animals and the carcasses are as follows:

GRADE.	Cost per 100 lbs.	Value at finish per 100 lbs. live wt.	Value of dressed carcass per lb.
Shorthorn	$3 75	$6 40	$0 08½
Angus	3 75	6 25	07½
Jersey	2 85	6 00	08
Holstein	3 25	5 50	07¾
Red Scrub	3 25	5 75	07½
Spotted Scrub	3 25	5 75	07

The value per one hundred pounds live weight as placed by Mr. Washington on the six steers was regarded by well-informed stockmen who saw the animals as a conservative price, and many thought that the steers would bring twenty to fifty cents per hundred above Mr. Washington's estimate. Several butchers examined the dressed carcasses and they considered that Mr. Gosling and Mr. Anthony had made an accurate estimate of the carcasses as based on prices of Kansas City packers. If these valuations on the live animals and on the carcasses were correct, we have the following showing:

GRADE.	Value alive when fatten'd.	Value of dressed carcass.	Loss to slaughterer.
Shorthorn	$91 90	$77 52	$14 38
Angus	73 13	55 13	18 00
Jersey	72 60	57 60	15 00
Holstein	71 34	59 99	11 35
Red Scrub	85 50	66 75	18 75
Spotted Scrub	78 78	57 26	21 52

These facts make creditable the statements often made by persons connected with the great packing-houses, that every dressed carcass sold from a packing-house is sold for less than is paid for the live animal that furnishes the carcass. They also show the remarkable utilization of the offal and by-products of slaughtering that enables the packing-house to make up the loss on carcass, pay running expenses and make profits.

The steers were fed corn and corn chop, which cost the College an average of $1.30 per hundred pounds, and alfalfa hay, which

cost $10 per ton. The cost of feed, cost of steers at beginning, value of steers when fattened, and loss in feeding are as follows:

Grade.	Cost of corn eaten......	Cost of hay eaten.......	Total cost of feed.......	Cost of steer at beginning..	Cost of steer when fattened.	Value of live steer when fattened...	Loss to feeder.....
Shorthorn	$38 62	$21 59	$60 21	$39 04	$99 25	$91 90	$7 35
Angus......................	32 79	14 56	47 35	33 08	80 43	73 13	7 30
Jersey.....................	32 58	20 84	53 42	24 57	77 99	72 60	5 39
Holstein...................	33 54	20 86	54 40	28 80	83 20	71 34	11 86
Red Scrub..................	33 51	21 34	54 85	34 19	89 04	85 50	3 54
Spotted Scrub..............	31 92	21 20	53 12	34 58	87 70	78 78	8 92
Total loss.........	....	....	....	....	....	....	$44 36
Average loss per steer......	....	....	....	....	....	....	7 39

The prices at which the steers were valued when ready for the market were high, but the unusual high cost of feed caused a loss in feeding every steer. These statements show plainly why the man who buys meat for his table has to pay high prices when feed costs so much.

Fortunately for the College, we had hogs following the steers to pick up the droppings. For reasons not connected with this test it was necessary to change the hogs frequently and vary the number so that no accurate account could be kept of the gains of the hogs. We greatly regret this. Work in previous feedings show two hundred pounds of pork per steer from seven months feeding, and it is probable that more pork was made in this feeding. The hogs therefore covered the loss on the steers and left a balance for labor and profit.

The cost of feed for each one hundred pounds of gain was as follows: Shorthorn $15.41, Angus $17.31, Jersey $15.16, Holstein $15.16, Red Scrub $14.15, Spotted Scrub $17.02, Average $15.70.

The largest corn-crib in the world is located near this College on the feeding grounds of Mr. C. P. Dewey. This crib is eight hundred fifty feet in length and holds over three hundred thousand bushels of corn. A few years ago this crib was filled with corn at a cost of thirteen to fifteen cents a bushel, and this corn was used in fattening steers. Beef was cheap then and consumers were happy. This year corn has cost seventy cents per bushel in Manhattan—from five to six times as much as it did when beef was sold at a low price. Alfalfa hay, the chief roughness fed in this section, with corn, in fattening steers, has cost from $10 to $12 per ton. When corn was cheap alfalfa hay sold at $2.50 to

$3 per ton. With the feed which makes beef costing from four to five times as much as it did when a few years ago beef was cheap, is it any wonder that steak costs more? The fact is, that beef has not increased nearly so much in price in proportion as has the feed which makes beef.

The writer knows nothing about the profits of the packer, but he does know that since feed has risen so high few feeders have made anything, and many have lost heavily in fattening steers. The high prices of beef prevalent a few weeks ago were barely sufficient to cover the cost of production. The recent agitation and the reduction in consumption of meat has lowered the price, and will cause added losses to almost every feeder in the West.

H. M. COTTRELL.

WHY STUDY VOCAL EXPRESSION?

MANY think that the study of vocal expression should be confined entirely to specialists, or to those who expect to become public readers, speakers, preachers, or lawyers. They think that there is no necessity of any one else studying the subject; that one who does devote any time to its study surely intends to be an "elocutionist," or a preacher, or a lawyer, while most preachers and lawyers stand on the other side of it, and regard it as being very well for childern, as an aid in "speaking pieces" for the amusement of their elders.

Nearly every one feels that it is helpful to take some training in singing, or to learn to play the organ or piano, and it is not taken for granted that a person who does study these things expects to go into opera, or become a professional musician, or to use their accomplishment for exhibition only. Most people like to dress well, but few are accused of trying to be "fashion plates." I ride a bicycle, but I hope no one assumes that I am training to become a professional bicycle racer. I have a friend who takes long walks, and I am confident that he does not harbor the ambition to become the world's champion pedestrian. All of these things are parts of our every-day life and are necessary to well-rounded manhood.

The study of vocal expression is a matter of general culture, and should form a part of the training of every normal human being. The voice in speaking is that expression of ourselves which must be seen and felt everywhere. It is the agent of the soul's

expression. It is used in every-day life. We speak before we write. It is the first thing we use, and is in more constant use throughout life than any of the voluntary functions. No one would think of entering a parlor with a smudge on the face, or the hair mussed, but alas! these same sensitive people will go through life with a "smudge" on their voices.

The improvement of the voice is directly associated with the improvement of the imagination and feelings. The whole mental and emotional condition of man is mirrored in his tone. The voice should be improved for the sake of its effect upon others, because it is a part of ourselves which goes out continually, to be heard and felt, and is a direct expression of our dispositions and characters.

Vocal expression should be studied because it has a reflex influence upon the speaker. The mind can be made more flexible. It can realize its own rigidity. The heart can be made more tender and sympathetic.

If we go back to the Greeks we find that at the time of their greatest endeavor and achievement, attention to the spoken word was universal. The voice is the fundamental agent of man's artistic nature, and attention to the spoken word has always been associated with artistic advancement.

There is a higher and broader reason why every one should study the development of the voice. It not only gives a direct stimulus to the imagination and to the whole artistic nature; it not only gives a man the development and practical use of his native tongue, as well as a readiness and power over his fellow-men, but it is instrumental in the development of character.

The great majority of people need to study vocal expression for the development of the elemental powers of man; to improve in every form and kind of expression, that they may better discharge their functions as men and women, as members of society, and as inmates of the home.

W. O. CLURE.

The visit on Monday of last week, of the Kansas City Commercial Club, was very short. They drove in stately procession through the campus, expressed their regret that they could not stop, and wended their way through the gate toward the rising sun. The College band was out early in the morning to greet them at the depot.

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.
Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS.........Local Editor
PROF. J. T. WILLARD.........Alumni Editor

LOCAL NOTES.

Professor McKeever has been appointed a member of the Manhattan teachers' examination board.

The Ionians gave a reception Saturday evening in the Gymnasium to the Faculty and the literary societies.

The Chemical Department has received several cases of much-needed apparatus ordered from Germany some months since.

Prof. A. B. Brown has been appointed by the Kansas Music Teachers' Association as a delegate to attend the National Music Association, in July, at Put-in Bay.

Ten persons took the State teachers' examination in professional branches Wednesday and Thursday. The names of the successful candidates will be published in the INDUSTRIALIST.

The Students' Coöperative Association has elected the following officers for the ensuing College year: President, H. T. Nielsen; manager of dining hall, R. F. Bourne; manager of bookstore, J. Tompkins; secretary, T. L. Pittman.

Dr. A. C. True, of the division of experiment stations, department of agriculture, Washington, D. C., made the annual inspection of our Experiment Station on Wednesday and Thursday. He attended chapel on Thursday morning and spoke to the students on the subject of agricultural education. From what he said he seemed to be greatly pleased with the condition of the Station of the Kansas State Agricultural College.

Assistant Weber, who has been dangerously ill with phlegmonous erysipelas, accompanied by gangrene, seems to be gaining slowly. It will be many weeks before he can be well, because of the large area over which new skin must grow. His physicians have resorted to skin-grafting to hasten the process, Mr. Weber's young friends furnishing the necessary tissue. While he is by no means out of danger, the strongest hopes are entertained of his ultimate recovery.

The annual meeting of the American Association for the Advancement of Science will be held at Pittsburg, Pa., from June 30 to July 3. The easily accessible location of the place of meeting, combined with its peculiar economic interest as a great industrial center, offers the opportunity for an exceptionally successful session. Several members of the College Faculty are members of the Association, but we do not know if any of them are financially able to attend the session.

The old screeching whistle which has for so many years proclaimed the alpha and omega of the working day was taken down from its perch on top of the power-house last Tuesday night by the shop boys and replaced by a new sonorous three-whistle chime. The new euphonium is a present from the Lunkenhimer Company, secured by the apprentice boys in the shops. All we need now is a correct clock—an automatic chronometer of some sort—to make the joy of the young engineers complete.

The most enjoyable social function of the present College year was the junior-senior reception given in Domestic Science Hall last Monday evening. It was plain to be seen that the juniors had spared no pains in preparing for the occasion. The decorations were tastily arranged and the interior of old Domestic Science Hall presented the appearance of a veritable paradise of superb beauty. The fore part of the evening was spent in having a good social time, after which all present retired to the Coöp. dining-hall, where elaborate refreshments were served, intermingled with junior toasts and senior responses. At a late hour all departed feeling that a pleasant and profitable evening had been spent.—*Students' Herald.*

The following is the program for the Memorial Day exercises at Manhattan: Memorial services will be held Sunday, May 25, at the Auditorium, at 2:30 P. M. Sermon by Rev. W. M. Elledge. The procession to the city cemetery will be formed at 9 A. M., May 30, and will start on Poyntz avenue, at 9:45 A. M., in the following order: Chief Marshal Wm. B. Rhodes, with aide and bugler; cadet band; Co. I, K. N. G.; College cadets; orator of the day; Lew Gove Post No. 100, G. A. R.; Spanish war soldiers; municipal authorities; Assistant Marshal Jno. Warner; Manhattan Post No. 271, G. A. R.; conveyances for disabled soldiers; W. R. C. and L. of G. A. R., in carriages; other societies; flower wagons. At 2:30 P. M. a program will be given in the Auditorium, consisting of music, and a memorial address by Hon. J. G. Waters, of Topeka.

Mrs. Charlotte Short-Houser, '91, formerly assistant in the Department of Domestic Science at this College, writes to Professor Walters that she and her husband are in good health and that both of them expect to graduate on June 4 from Dickinson College, Carlisle, Pa. She says: "Mr. Houser, who is a graduate of the law school of Drake University, Des Moines, Ia., graduates from the law school with the degree of LL. B., and I graduate from the scientific course of the college (Dickinson) with the degree B. S. I have done special work for a year in English literature, and French and English drama. There are twenty-two members of the law-school class, while there are seventy members of the graduating class of the college—the largest class so far in the history of the institution. Attorney General John P. Elkin, of Pennsylvania, will deliver the oration to the graduating class of the law school, and Bishop Andrews, of New York, will deliver the annual sermon."

A recent election by the stockholders of the *Students' Herald*, of executive officers for the ensuing year, resulted as follows: R. F. Bourne was promoted from local to editor-in-chief; H. T. Nielsen is to be business manager; Miss Cross was given the associate literary department; F. W. Boyd was made local, with T. L. Pittman as associate; N. L. Towne was elected to the place vacated by Nielsen. The remaining members of the staff hold over.

We fully coincide with the sentiment of the following excerpt from the last number of the *Nationalist*, and second the proposed motion: "There ought to be an ordinance, or the ordinance already in existence ought to be enforced, to compel the trimming of trees along the sidewalks. The rural aspect of some portions of town is no less than disgraceful; moreover it is exceedingly unpleasant for people who prefer walking on the sidewalk to taking the middle of the street. There are some advantages in living out in the brush; but people who insist on making their homes in towns ought to give up the backwoods manner of life and keep up a certain appearance of civilization."

ALUMNI AND FORMER STUDENTS.

Ross Long, '99, has been admitted to the Topeka bar.

A daughter was born on the 17th instant to Flora Day-Barnett and R. J. Barnett, of the class of '95.

Myrtle Mather, assistant in the Preparatory Department, and a member of the senior class, has been chosen from among several candidates to take up the teaching of domestic science in the Girls' Industrial School at Beloit. This is the work which is being inaugurated under the direction of Miss Gertrude Coburn, '91.

Miss Maude Barnes [second-year 1897], of Alma, and Mr. Roy O. Smith, of Herington, were married at the handsome home of the bride in Alma at 9 o'clock this morning. Only immediate friends and relatives attended. An elegantly appointed luncheon followed the ceremony. The bride, a woman of extremely charming personality, was daintily gowned in white batiste. Her traveling dress was a very chic blue tailor-made. Mr. and Mrs. Smith are in the city this afternoon en route to their future home in Herington. An extended wedding trip has been planned later in the season.—*Topeka Herald*, May 21.

S. J. Adams, '98, general secretary of the College Y. M. C. A., became violently insane last week, and it became necessary to put him in confinement. The causes of his unfortunate derangement do not seem to be known. He has apparently been worrying over various matters a good deal of late, but the turn that this took seemed to be an indication rather than a cause of insanity. Mr. Adams has done a great deal of laborious and conscientious work in his position as general secretary of the Y. M. C. A., and has accomplished much in holding and inciting the young men to right ideals of manhood and studentship. We all hope that treatment at the hospital at Topeka will soon restore him to health.

PROGRAM.

COMMENCEMENT WEEK, 1902.

Friday, June 13.

Recital by Music Department, College Chapel, 8 p. m.

Sunday, June 15.

Baccalaureate Sermon, College Chapel, 4 p. m., by Rev. J. T. McFarland, D. D., Pastor First M. E. Church, Topeka.

Monday, June 16.

Society Entertainment, to Invited Guests, College Chapel, 8 p. m.

Tuesday, June 17.

Examinations from 9 a. m. to 3:35 p. m.

Class Day Exercises, to Invited Guests, Opera House, 8 p. m.

Wednesday, June 18.

Examinations from 9 a. m. to 12:20 p. m.

Business Meeting Alumni Association, College Chapel, 2:30 p. m.

Calisthenic Drill, 7 p. m.

Triennial Alumni Address, College Chapel, 8 p. m., by Mrs. Nellie Kedzie-Jones, M. S.

Thursday, June 19.

Annual Address, College Chapel, 10 a. m., by Pres. W. M. Beardshear, LL. D., Ames, Iowa.

Presentation of Diplomas.

Parade of Live Stock at 2 p. m., followed by Band Concert.

Military Drill at 3 p. m.

Reunion of Literary Societies.

Triennial Alumni Banquet, Gymnasium, 8:30 p. m.

Volume 28. Number 31.

THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE AGRICULTURAL COLLEGE

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Editor-in-Chief,	PRES. E. R. NICHOLS
Local-Editor,	PROF. J. D. WALTERS
Alumni Editor,	PROF. J. T. WILLARD

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THE INDUSTRIALIST.

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COW-PEAS.

THE cow-pea is a bean and belongs to the same class of plants as alfalfa and clover. Our correspondents often get it confused with the Canada field pea, which is a genuine pea, while the cow-pea is a bean. This mistake is sometimes costly, as the field pea is the plant often sown with oats and must be sown as early in the spring as oats or the crop will be a failure, while the cow-pea is killed by slight frost and must not be planted until all danger of frost is over. Some correspondents get the cow-pea and soy-bean confused. Both are true beans. The soy-bean is an erect-growing plant with a stiff, woody stem, having many branches like a miniature tree. The pods are short and contain two to three beans in a pod. The cow-pea has a slender, trailing vine, sometimes growing partly upright, the vines from three to fifteen feet or more in length. The pods are long and slender and there are ten to twenty beans in a pod.

DROUGHT RESISTER.—After getting a good start the cow-pea will grow and thrive under greater heat and more severe drought than any other field plant grown on a large scale on the College farm. Kafir-corn and soy-beans are good drought resisters and will do well with any ordinary lack of moisture, but during the extreme drought and heat of July and August, 1901, when Kafir-corn withered and stopped growing and the blossoms on soy-beans were killed by the heat as fast as they appeared, cow-peas in the same field on the College farm grew right along and looked fresh and vigorous every morning, although they wilted some during the middle of the day. The field was high upland, with a thin soil and stiff clay subsoil.

VALUE FOR FEED.—The cow-pea is rich in protein (the material necessary in formation of lean meat, milk, and blood) and in mineral matter. This makes it of special value in feeding growing calves, pigs, and dairy cows. The following table shows how cow-pea hay compares with hay from other plants:

HAY.	Per cent mineral matter.	Per cent digestible nutrients.		
		Protein.	Carbo-hydrates.	Fat.
Timothy	4.4	2.9	43.7	1.4
Red clover..........	6.2	6.8	35.4	1.7
Cow-pea............	7.5	10.8	38.6	1.1
Alfalfa*............	10.5	14.3	43.0	1.0
Soy-bean	7.2	10.8	38.7	1.5

* Cut when first bloom appeared.

This table shows that so far as composition goes cow-pea hay is more valuable than red clover and stands next to alfalfa hay. Feeding trials confirm the showing of the table.

As a pasture the cow-pea has similar good qualities to alfalfa and red clover and has the same defects. Cow-peas are a safe and good pasture for hogs and a good pasture for dairy cows and other cattle and sheep, but with the ever-present danger of bloat.

At the College we have raised cow-peas for several years but have made no accurate feeding experiments with them because of lack of funds.

Prof. F. C. Burtis, at the Oklahoma Experiment Station, found that with fattening pigs fed all the grain they would eat, one lot fed grain alone required eight and one-fifth pounds of grain for each pound of gain while another lot fed cow-pea hay and grain required only four and three fourths pounds of grain for each pound of gain. The cow-pea hay saved forty-two per cent of the grain. The hogs fed cow-pea hay in addition to grain had the best appetites, ate the most grain and gained the most rapidly.

Prof. J. F. Duggar, at the Alabama Experiment Station, divided a bunch of fifty-pound pigs, putting one lot on corn alone and the other lot on corn and cow-pea pasture. In six weeks the pigs on corn alone gained forty-five pounds while the pigs on corn and cow-pea pasture gained one hundred twenty-two pounds. The pigs on corn alone ate five and nine-tenths pounds of corn for each pound of gain while the pigs on pasture ate three and one-tenth pounds of corn for each pound of gain. At the conclusion of this experiment the pigs were put in fattening pens. The first lot was continued on an exclusive corn ration and gained sixty-eight pounds in seventy days. The lot that had been pastured on cow-peas were put on a grain ration of one-half corn and one-half cow-peas, ground, and gained one hundred eight pounds in seventy days. The lot on corn alone required eight pounds of

grain for one pound of gain and the other lot five and three-tenths pounds grain for one pound of gain. After deducting the gain from the corn Professor Duggar secured three hundred fifty-five pounds of pork per acre of cow-peas on poor soil. The pork from the hogs fattened on corn and cow-peas had a fine, delicate flavor and the fat was firm.

SOIL IMPROVER.—The cow-pea enriches the land on which it grows the same as alfalfa, clover, and soy-beans. It makes hard soils mellow and aids in holding loose soils together.

Prof. C. L. Newman, at the Arkansas Experiment Station, sowed cow-peas in corn at the last cultivation and harvested both corn and cow-peas. The next season the yield of corn on this ground was three bushels more per acre than on adjoining land where cow-peas were not planted with corn. On light, sandy land, impoverished from continuous cropping, the yield per acre from wheat was as follows:

	Bushels.
Wheat following wheat	10.0
Wheat following cow-pea vines plowed in	11.4
Wheat following cow-pea stubble plowed in	15.8
Wheat following wheat, cow-pea stubble plowed in between crops	16.5

A test made with oats on similar soil showed the following yields per acre:

	Bushels.
Oats following corn	24.7
Oats following sorghum	20.8
Oats following cow-peas	38.8
Oats following soy-beans	35.2

Nitrogen is usually the most needed element of plant growth and the cow-pea takes this from the air and by the decay of roots adds the nitrogen to the soil in a form which makes it of special value to following crops. The nitrogen is taken from the air by means of bacteria which grow in tubercles on the roots. In Kansas soils these bacteria are present, but in small numbers. The first planting of cow-peas will have a small number of tubercles only. If cow-peas are grown on the same land the following year the number of tubercles is greatly increased and with it the fertilizing effect. For this reason we advise growing cow-peas for two years in succession on poor soils.

The mechanical improvement in the soil made by cow-peas is greater than the fertilizing effect. Cow-peas make a vigorous root growth, the stubble decays quickly and many leaves fall and decaying mix with the soil. In these ways much vegetable matter is added to the soil and this vegetable matter increases the

ability of the soil to absorb and retain moisture and to withstand drought. With hard upland soils we have found the land to plow up mellow in the spring where cow-peas had been grown the previous season. With loose and sandy soils the addition of vegetable matter from the cow-peas assists in the better holding of the soil together and the land does not blow or wash so badly.

For these reasons the cow-pea is a good crop to grow for one or two years before seeding to alfalfa on soils that are either too loose or too stiff or hard. With soils that blow badly we have left the vines on the land through the winter just as they grew. The vines held the snow and checked blowing in the spring.

There are a hundred or more varieties of cow-peas. Many varieties have been tried at the Kansas Experiment Station. A description of some of the leading varieties that we have tried follows. The description was written by Mr. O. H. Elling while acting assistant in field and feeding experiments:

CLAY has several well-defined strains that vary in time of ripening and in color, but as a rule they are later than the Whip-poor-will. It produces a large tangle of vines and a small amount of seed only. In Kansas the seasons are usually too short for it. It has the disadvantage of being hard to handle when cut, owing to its tendency to run and twine, and in most seasons produces no seed.

GRANITE CROWDER is an early variety; the stem is rather thick at base, from which stem-like runners grow from four to eight feet long and form a complete woven network. The leaves are large and thick. The pod grows from six to eight inches in length and is well packed with seed, but owing to the fact that the pods are not numerous the grain yield is only fair, and on account of its tendency to run and twine this variety is difficult to cut and handle for hay and the yield of vines is not heavy.

IRON PEA. Medium early. This variety stands up well, the vine is rather coarse and yield only fair. While it has a bush form, still it twines much, but not enough to make it difficult to handle for hay. The pod is slender, seven to nine inches long, and well filled with seeds. The pods are not numerous on the plant.

NIGGER is a medium early variety. The pods are six to seven inches long and the seeds small and black. The plant produces runners and trailers quite extensively, forming a network flat on the ground. For these reasons it is not desirable for cutting for hay. The seed yield is only fair.

TWO CROP. Early variety; it grows more in the form of a bush, yet under favorable conditions it twines considerably, growing branches from three to five feet in length. The pods are eight to ten inches long, slender, quite numerous, and a good yield of grain may be expected; but it has the disadvantage of blooming the whole season and frequently many peas "pop out" and are lost while the plant is yet in bloom.

UNKNOWN or WONDERFUL is a late variety. It is upright, comparatively free from runners, and a heavy yielder of vines and is easily handled. It has large, coarse leaves and does not mature seed at this Station.

EXTRA LARGE BLACK EYE is a medium early variety. It produces a good yield of seed, and a fair yield of vines, yet it has the great disadvantage of dropping its leaves very early in the season before reaching the stage of maturity. The pods are from seven to nine inches long and the seeds are large, white, with a black spot on each one.

WHIP-POOR-WILL. Medium early. This variety is probably the best variety tested at this Station when both grain and hay are considered. It is a typical "bush" variety, yet under most favorable conditions produces runners. Its yield of both peas and vines is good and its tendency to retain the leaves makes it superior to many other varieties. The pod is from seven to eight inches in length and well filled with seed. The bean is medium in size, of a dark brown color, spotted with brown spots of a darker color.

Nine varieties planted June 1 made the following records:

	Blossomed.	Ripe.
Black	No blossoms	———
Black Eye	August 6	September 1
Clay	August 12	Did not ripen.
Granite Crowder	July 21	August 20
Iron Pea	July 30	August 31
Nigger	August 8	August 30
Two Crop	July 24	August 25
Unknown, or Wonderful	Did not mature.	
Whip-poor-will	August 2	September 1

The Iron, Nigger and Whip-poor-will varieties were cut a second time for hay October 8. Continuous rains spoiled the entire second cutting.

For most conditions in Kansas we recommend the Whip-poor-will. On high upland it yields one and one-third tons of hay per acre the first cutting. On good land it yields from one and one-half to two and a half tons of hay per acre. It will usually be found most profitable to either pasture or leave on the ground for fertilizing the second growth of this variety on account of rains at the time of harvesting.

PLANTING.—Planting must not be done until all danger of frost is over. We make our first planting after we have finished planting corn and Kafir-corn. This makes the planting of the cow-peas come from May 20 to June 1. We plow and prepare the ground the same as for surface planting of corn. If the ground is thoroughly clean the cow-peas may be sown broadcast aud covered with a harrow. If the ground is not free from weeds the beans should be drilled in rows thirty-two inches apart, dropping single beans two to four inches apart in the rows. When planting in drills the cow-peas should be cultivated the same as corn. Broadcast cow-peas make the best quality of hay, as the stems are finer. Cultivated cow-peas have yielded the greatest weight of hay for us, but the stems are so coarse that there is a large waste. Where

the cow-peas are sown in drills, from one-half to one bushel of seed is required. When sown broadcast, two to two and a half bushels of seed are necessary.

Both early planting and thick seeding result in a heavy production of vines and few seeds. Late planting and thin seeding is productive of light growth of vines and heavier yield of seed. This has been the case every year we have grown the cow-peas.

Prof. C. L. Newman, at the Arkansas Experiment Station, sowed Whip-poor-will cow-peas with the following result:

Seed per acre.	Hay, pounds.	Cow-peas, Bu.
One peck................	3,314	31.4
Four pecks..............	2,463	25.4
Eight pecks.............	1,749	16.4

He says: "If to grow shelled peas is the object, not less than ten nor more than twenty pounds of seed drilled per acre will give best results. If hay or green manuring is the object, not less than thirty nor more than sixty pounds of seed should be sown. If a crop to smother weeds is desired, from fifty to one hundred pounds may be sown broadcast, or half these quantities in two and a half to three foot rows and cultivated."

As a Second Crop.—July 16, 1900, F. A. and F. C. Abbott, Manhattan, Kan., planted fifteen acres of cow-peas on oat stubble on sandy river bottom. A crop of oats was grown on the land and harvested. After the oats were stacked the ground was listed, the lister opening the furrows in the oats stubble just as it was left at harvest. The furrows were run about three feet apart, and the cow-peas were drilled in the bottom of the furrows with an ordinary one-horse corn drill, four bushels of seed being used to plant fifteen acres. The drill did not cover the seed well and the ground was harrowed to get more dirt in the furrows. The Whip-poor-will variety was used.

The beans were cultivated twice with an ordinary two-horse cultivator. This left the ground nearly level at the last cultivation. The season was very dry, but the beans made a heavy growth and at the time of cutting, October 4, stood two feet high and covered the space between the rows.

The Abbotts tried to cut the crop with a mower, but found this unsatisfactory, as the mower could not reach the vines that were on the ground; and with part of the vines cut and part uncut it was difficult to gather the tangled mass. Finally, after consultation at the Kansas Experiment Station, the Miller bean-harvester

was tried and found to do the work just right. This machine is made by the LeRoy Plow Company, LeRoy, N. Y., and was designed for harvesting navy beans, but it was found just as successful in harvesting soy-beans and cow-peas.

With the Miller harvester two rows were cut at a time, the knives cutting off the plants just below the surface of the ground and the wings above the knives throwing the vines together into a windrow. The vines were put up in small cocks, where they were left to cure until dry enough to stack. The yield of hay was estimated to be one ton per acre, possibly a little more.

In the summer of 1901 the Abbotts repeated the experiment. On account of drier weather the yield was somewhat less, but the results were satisfactory.

The College farm is all upland and we have not succeeded in getting a profitable crop of cow-peas when the planting has been done after harvest. When the soil is sufficiently moist we have had best results from surface planting; when the soil is dry we recommend listing.

HARVESTING.—The upright-growing varieties of cow-peas may be cut with a mowing-machine. With the varieties which run along the ground the mowing-machine cannot be run close enough to the ground to cut anywhere near all the plants. We have had the best results from cutting the cow peas with a bean-harvester. After cutting, the cow-peas should be raked, cocked and cured the same as clover or alfalfa. The stalks are large and very succulent and curing is much more difficult than with either alfalfa or clover. The cow-pea is ready to cut in Kansas just as the fall rains set in. This makes curing still more difficult. Sometimes it has taken us two weeks during showery weather to get the cow-peas sufficiently cured to stack. The most valuable part of the hay is the leaf, and unless handled very carefully a large proportion of the leaves will fall off in handling before the stems become cured. When the weather is favorable the curing is easy and the hay is of good quality.

OBJECTIONS TO COW-PEAS.—The greatest objection is the one just mentioned—that of curing the hay. The one other serious objection to cow-peas is the high cost of seed. Practically all of the seed sold by seedsmen is raised in the South, where the pods are gathered and threshed by hand. Southern-grown cow-pea seed, like most Southern-grown seed, is weak in germination

under Kansas conditions and matures late and irregularly. The seeds costs from $1.25 to $2.50 per bushel, and an extra quantity of seed has to be used because the seed is not acclimated.

Several Kansas farmers have reported having good success from broadcasting sorghum or Kafir-corn with cow-peas. The sorghum or Kafir-corn made the curing of the cow-peas easier and the richness in protein of the cow-peas improved the quality of the feed. This year several Kansas farmers expect to drill a row of cow-peas between the rows of corn at the last cultivations, and will cut the corn and attached cow-peas and shock. The cow-peas will improve the quality of the fodder.

Where the few seeds that mature from the first planting in Kansas are planted a much greater proportion of seed matures from the following crop than from Southern-grown seed. In southeastern Kansas several farmers have bred up acclimated seed that overcomes most of the defects found in seed from the South. When farmers in all parts of the State develop acclimated seed, the seed will become cheaper, less will be required per acre, and the crop will be more satisfactory. It is reasonable to think that enterprising Kansas farmers, when they get to growing this crop largely, will find practical methods of harvesting and threshing cheaply with machinery.

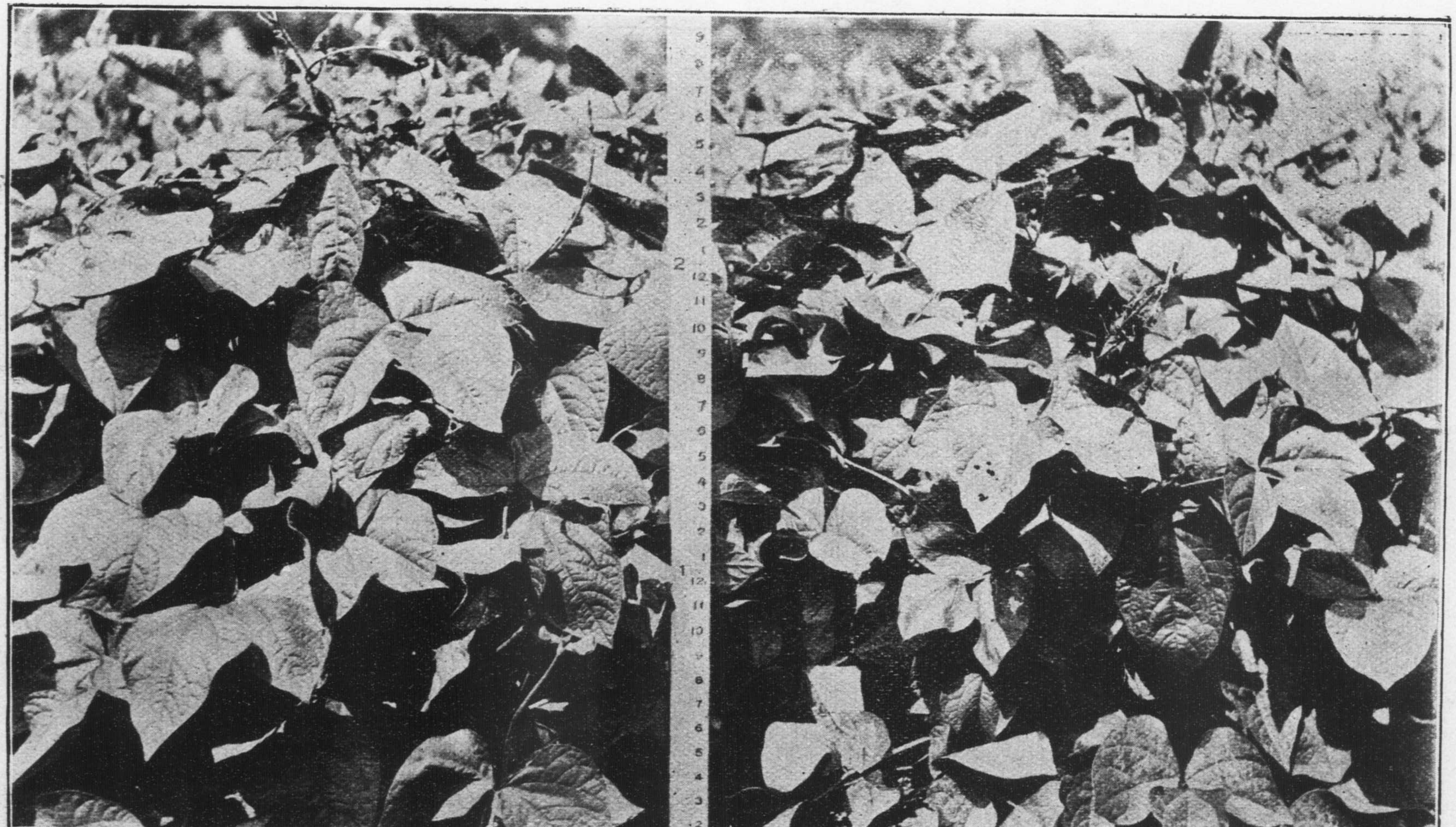
COW-PEAS OR SOY-BEANS, WHICH?—This is a question which we are asked very frequently. With the present quality of seed we recommend the cow-pea where hay is desired and where fertilizing the ground is the chief reason for sowing. Where grain is the chief crop desired, the soy-bean is much the best.

CONCLUSION.—After five years' experience with the crop on the College farm and a careful investigation of its growth on many farms scattered over the State, the writer believes that the cow-pea is one of the coming crops of Kansas. Its value as a feed, its adaptation to all classes of soils, its improvement of soils both in fertility and in mechanical condition, the fact that it can be raised as a catch crop without interfering with the regular crops and its ability to resist drought and heat makes the cow-pea of great use to Kansas farmers. As soon as acclimated seed can be procured at a low cost, raising the cow-pea should become general.

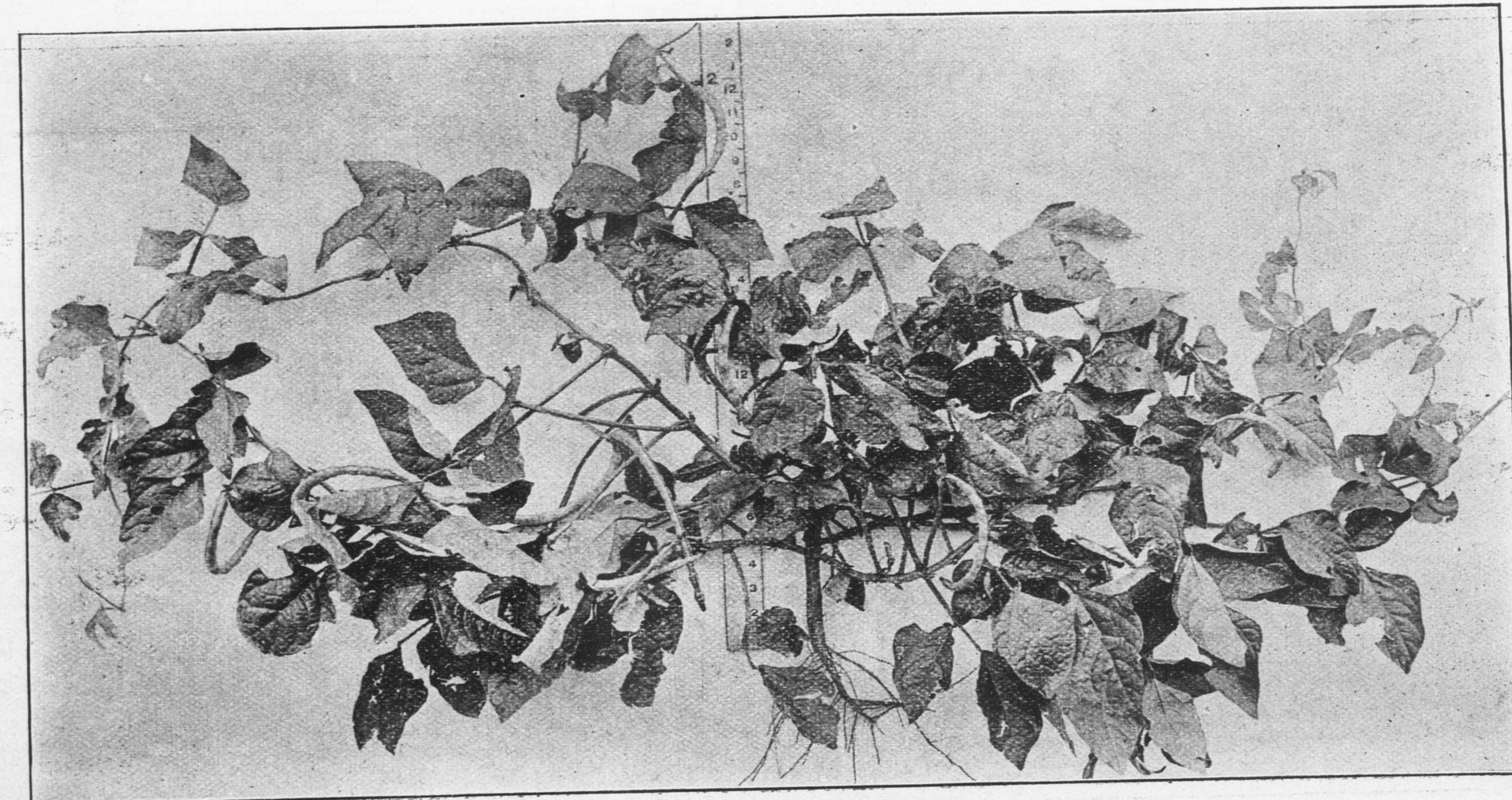
The cow-pea will not become a main crop on Kansas farms. There are other crops much better for this purpose, but it should be used on every farm in spots that need improving in fertility or mechanical condition and on stubble grounds where another crop is not to be planted until spring.

H. M. COTTRELL.

UNKNOWN, OR WONDERFUL COW-PEA.

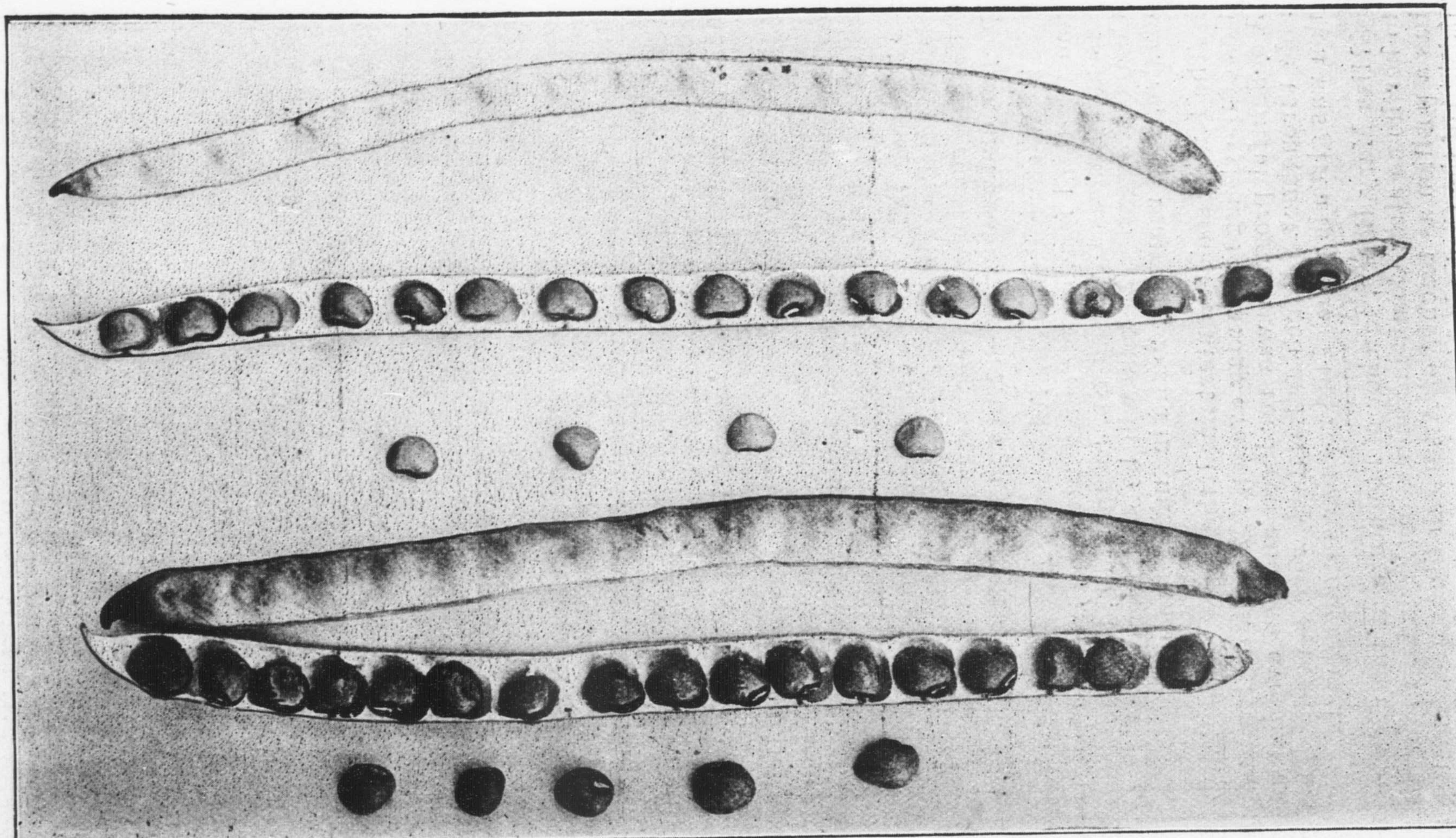


WHIP-POOR-WILL COW-PEA.



NIGGER COW-PEA.

BLACKEYE COW-PEA.



PODS AND SEEDS, COW-PEA.

THE INDUSTRIALIST.

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Manhattan, Kansas.

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PROF. J. D. WALTERS.......... Local Editor
PROF. J. T. WILLARD.......... Alumni Editor

LOCAL NOTES.

Miss Emma Alice Follin (second year 1898) will be graduated from Baker University, at Baldwin, Kan., June 4.

Invitations are out for the marriage of W. P. Tucker, '92, and Stella V. Kimball, '94, at the residence of the bride's parents, June 12, 1902.

Fred Fockele, '01, was a visitor last week. He will not be here Commencement, as he will be cashier of a new bank at Gridley at that time.

Miss E. A. McIntyre, professor of domestic economy, read a paper, subject, "Industrial Education for Girls," before the State Federation of Clubs, which was in session at Salina last week.

C. E. Rice, '97, sergeant Sixteenth United States Infantry, was mustered out April 4, and is now employed in the quartermaster's office at Cauayan, North Luzon, P. I. He plans to come home soon.

We notice by the *Boulder Chautauqua Journal* that Dr. A. Emch, formerly of this College, will deliver a series of lectures on mathematics at the Colorado chautauqua assembly, which meets at Boulder from July 4 to August 8.

Foreman Dale, of the carpenters working on the new Physical-Science Hall, opened the 121st keg of nails last Friday morning. The nails consumed in the construction of the building, including plaster and roofing nails, will run up to from eight to ten tons.

The Western Passenger Association has granted a rate of one and one-third fare, on the certificate plan, from all points in Kansas and Kansas City and St. Joseph, Mo., to Manhattan during Commencement. Tickets will be sold from June 12 to 18, inclusive, good returning to and including June 23.

The Ionian society entertained the three other literary societies of the College Saturday evening, May 24, in Gymnasium Hall. A delightful program was rendered and the evening was enjoyable throughout. Punch and wafers were served. This reception was given in place of the regular spring annual.

Miss Mary Berry, teacher of literature at the College, will go to her home after Commencement, in Clarinda, Iowa, where she has a position as teacher of American literature, and the principalship of the Clarinda high school. Miss Berry has given general satisfaction in her work at this College and everyone wishes her success in her new position.

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Ina F. Holroyd, B. S. (K. S. A. C.), Assistant in Preparatory Department.......721 Pierre street
Marian F. Jones, M. S. (K. S. A. C.), Assistant in Domestic Art.......................... ——
G. O. Greene, B S (K. S. A. C.), Assistant in Horticulture............................ ——
John O. Hamilton, B. S. (Chicago), Assistant in Physics................................ ——
Hetty G. Evans, (Mass. Normal Art School), Assistant in Drawing..........Fourth and Osage
V. M Shoesmith, B. S. (Mich. Agr. Coll.), Assistant in Agriculture........................ ——
Eleanor Harris, B. M. (Chicago College of Music), Assistant in Music...................... ——
F. C Weber, B. S. (Ohio State University), Assistant in Chemistry...........Fourth and Osage
W. E Mathewson, B. S. (K. S. A. C.), Assistant in Chemistry............................ ——
A. E. Ridenour, B. S. (K. S. A. C.), Forman in Foundry..............................Fourth and Moro
W. D. Cramer, Pd. B. (Mich. Normal Coll.) Assistant in Zoölogy........................ ——
G. A. Dean, B. S. (K. S. A. C.), Assistant in Entomology,.................................. ——
Jacob Lund, M. S. (K. S. A. C.), Supt. Heat and Power Department...Cor. Tenth and Kearney
C. Jeanette Perry, B. S. (K. S. A. C.), Executive Clerk.............................722 Humboldt street
Matilda Doll, Stenographer.. ——
Alice M. Melton, B. S. (K. S. A. C.), Clerk in Director's Office............................ ——
Minerva Blachly, B. S. (K. S. A. C.), Bookkeeper.. ——
Charles Hughes, Secretary to the President.. ——
W. R. Lewis, Janitor..N. E. corner Main College Building

THE INDUSTRIALIST.

VOL. 28. MANHATTAN, KAN., JUNE 17, 1902. NO. 32

A RETROSPECT.

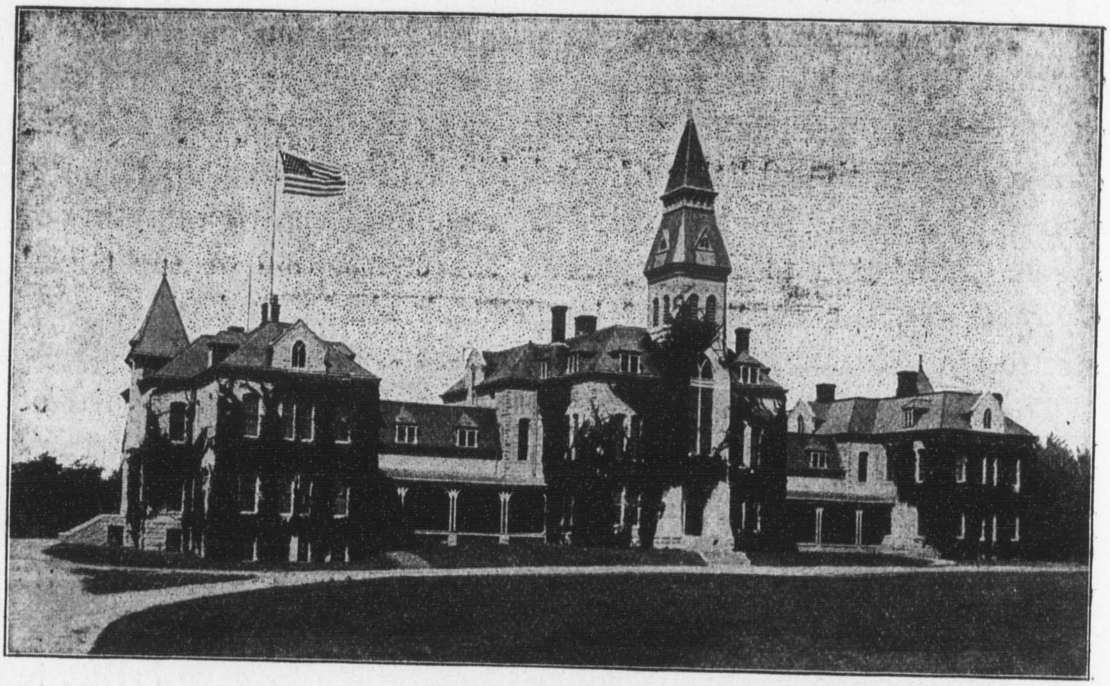
THE College year now drawing to a close has been a period of intense growth for the Kansas State Agricultural College. The institution has witnessed another increase in students and teaching force, the inauguration of new lines of work, especially in stock judging, the addition of much illustrative material, the erection of a large and solid Physical-Science building, the starting of a roomy addition to Library Hall, the completion of the Girls' Gymnasium, the erection of large stock sheds, and other substantial improvements almost too numerous to mention.

The College, that is its students, the Faculty, the Board of Regents, and the whole State, take pride in this growth. They feel that the rapid development of the institution is the result of hard work, well directed and properly done, and the INDUSTRIALIST should be pardoned when it proceeds to enumerate in its Commencement number some of the items of special expansion. The only regret is that it will be impossible to give credit in every quarter where credit is due, or to mention all lines of growth that deserve to be mentioned. The Kansas State Agricultural College is about to complete its thirty-ninth year, and its growth has been so constant that it has become one of the great educational centers not only of Kansas but of America. It is to-day the most characteristic institution of the State and the one that stands in closest connection with the various lines of occupation of the people of the West.

The thirty-ninth catalogue published a few days ago enumerates a Faculty of twenty-three professors and heads of departments, thirty-five regular assistants, six other officers, twenty-seven student assistants, and a number of regular employees of the Experiment Station. These figures do not include the sixty-two officers of the College battalion and the eleven officers of the College band.

The catalogue publishes the names of a total of 1396 students

who have received instruction in the different departments during the year. Of these 1334 came from 90 counties of the State, and 63 from 17 other states or countries. The increase over the attendance of last year is 75, and this in spite of the fact that the failure of the corn crop of last summer had caused the general fear and prediction that once again the number of students would remain stationary or show a decrease. The following schedule will give the summary of attendance:



MAIN BUILDING.

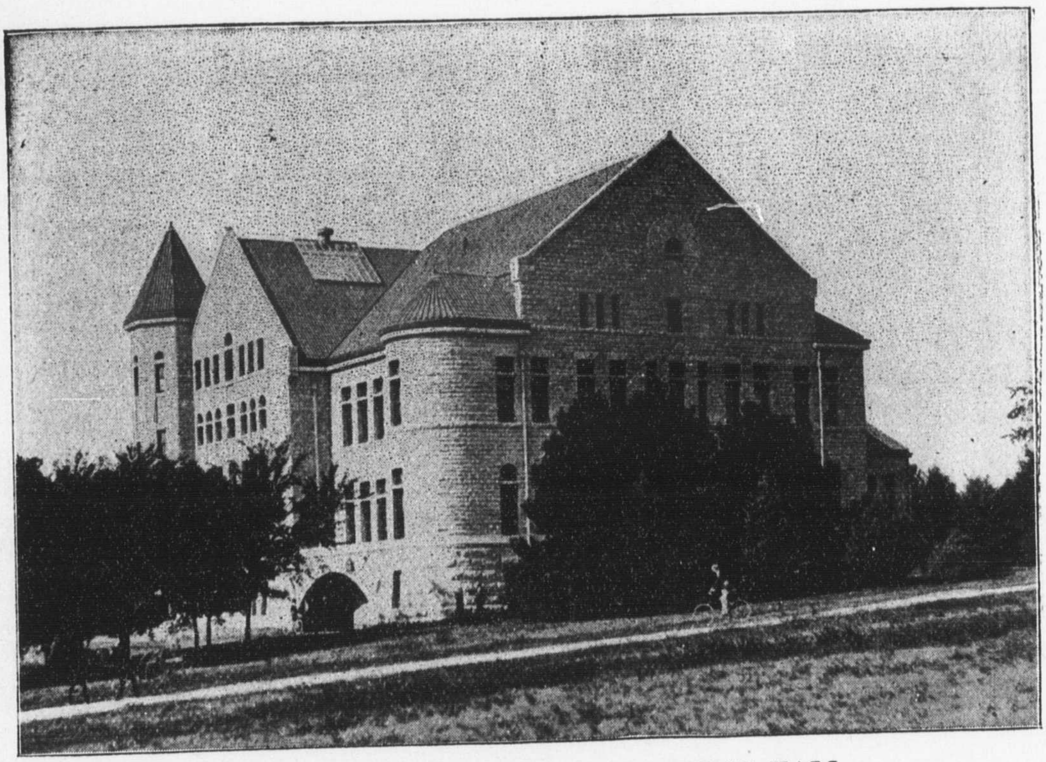
Classes.	Men.	Women.	Totals.
Graduate	15	17	32
Senior	42	23	65
Junior	81	39	120
Sophomore	130	76	206
Freshman	280	116	396
Preparatory	239	59	298
Special	7	12	19
Dairy	66	......	66
Farmers' short course	124	1	125
Domestic science short course	......	41	41
Apprentices	84	3	87
Counted twice	*51*	*8*	*59*
Totals	1017	379	1396

A comparison of these figures with those of the past eight years will prove the foregoing statements. In 1893–94 the total attendance was 555, in 1894–95 it was 572, then the figures ran up

to 647, 734, 803, and 870, after which they jumped to 1094 and to 1321. Surely if the growth of the student body is an index to the growing popularity of a higher institution of learning, the Agricultural College and its friends have cause for rejoicing.

Relative Attendance of Courses.

Four years ago when the single course of study, which had been followed with slight changes since 1880, was divided into



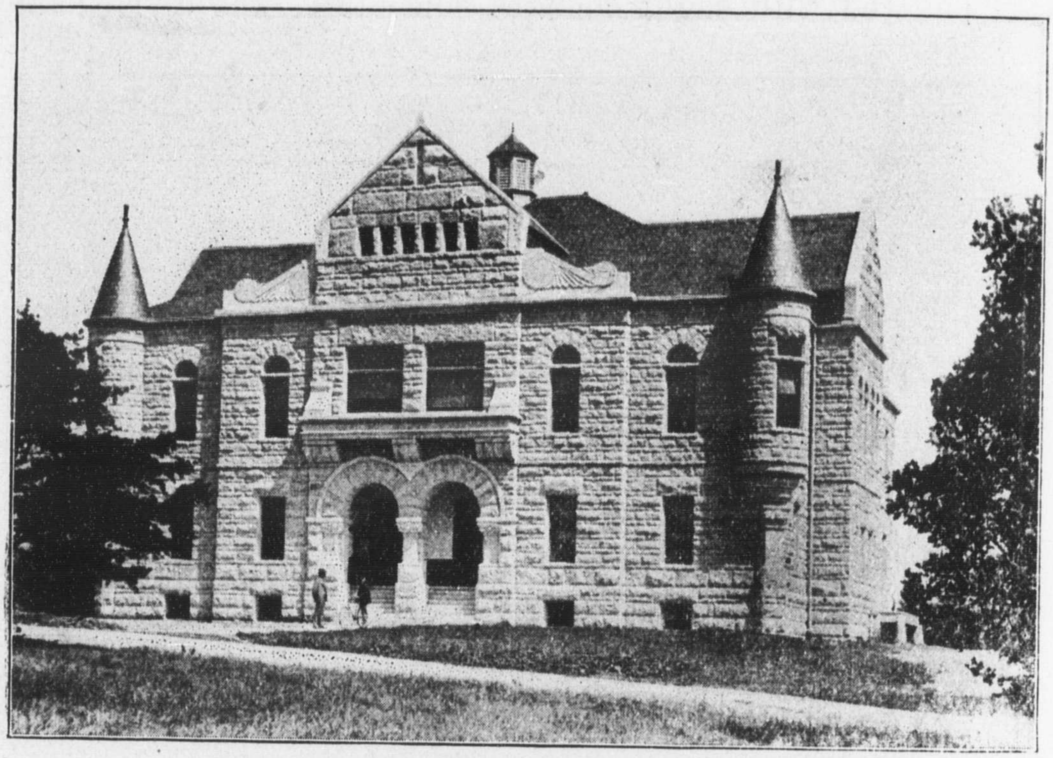
LIBRARY AND AGRICULTURAL SCIENCE HALL.

technical courses—a course in agriculture, a course in engineering, a course in domestic science, and a general science course—the friends of the College everywhere asked: What will be the results? Will the students drift into engineering branches to the detriment of Agriculture? What will the young women do? Will not agriculture and other practical branches suffer?

To-day we are able to give statistics for the past four years and the figures will show conclusively (1) that the technical courses as a whole are gaining at the expense of the general science course; (2) that the agricultural course is gaining faster than the engineering courses; (3) that the domestic science course is gaining faster than any other.

It will be seen from the following table that four years ago only 22.1 per cent of the male students enrolled in the agricul-

tural course, while at present 40 per cent are taking this course; it will be seen that engineering has gained at the ratio of 27.8 to 36.1, which is considerably less than the gain in agriculture; and that the domestic science course started four years ago with 34.6 per cent of all the women students, while at present it enrolls 78.1 per cent, which is over three-forths of all the young women:



AGRICULTURAL HALL.

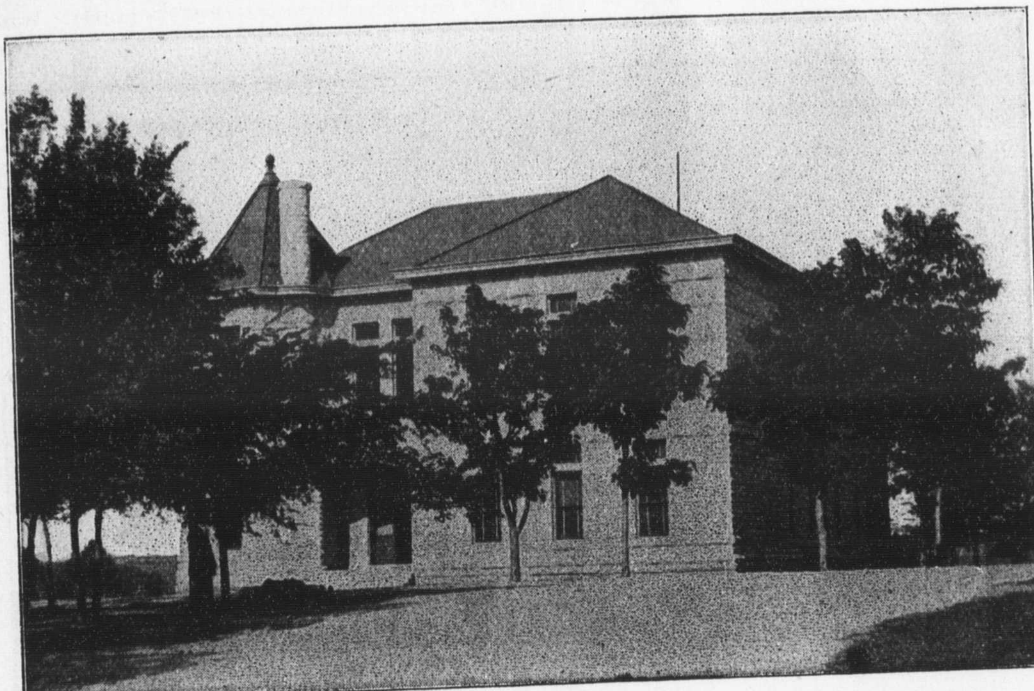
STUDENTS IN THE DIFFERENT COURSES.

YEAR.	Total.	Men.						Women.			
		Agriculture.		Engineering.		General Science.		General Science.		Domestic Science.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
1898-9	870	127	22.1	160	27.8	287	50.1	193	65.4	103	34.6
1899-0	1094	257	34.1	201	26.7	296	39.1	170	50.0	170	50.0
1900-1	1321	378	39.6	293	30.7	284	29.7	109	29.8	257	70.2
1901-2	1396	407	40.0	367	36.1	243	23.9	83	21.9	296	78.1

In connection with the above it should be noted that all young men have the same work during the first year, which includes one term each of agriculture, botany, physics, woodwork, blacksmithing, and foundry work; and all young women take, during the first year, one term each of cooking, botany, and physics, and three terms of sewing.

Increase of Time Given to Agriculture.

Not only has agriculture gained by the establishment and strengthening of the agricultural course, but it has made net gains in the amount of time given to agricultural teaching, as the following figures will show. If we multiply the number of students in each class by the number of hours of agricultural studies



DOMESTIC SCIENCE HALL.

taught we will evidently obtain a product which will show more than any other figures could do the total amount of agricultural work done. This is what has been done in the following table:

Year.	Hours.
1896-7	12.500
1897-8	8.930
1898-9	15,462
1899-0	76.234
1900-1	112.808
1901-2	123.186

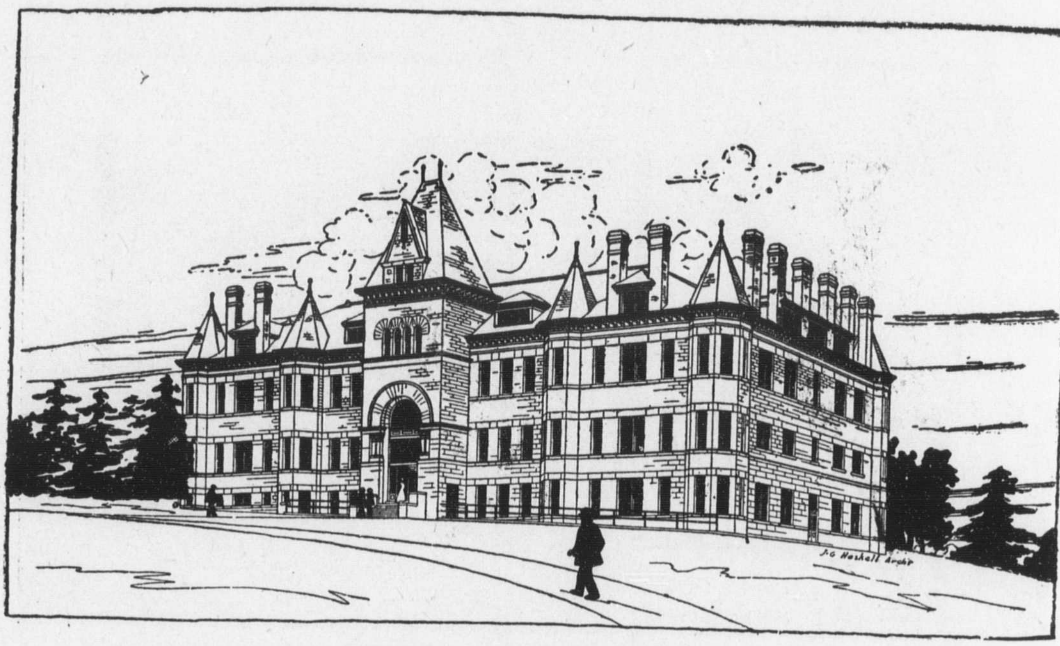
If all the subjects directly related to agriculture, such as horticulture, veterinary science, etc., had been included, the difference in favor of the last three years would have been still more marked.

The New Physical-Science Hall.

The most conspicuous improvement of the "College village" is the new Physical Science Hall now nearly completed. It will be remembered that the old Chemical Laboratory, which had been built in 1876 and had become entirely inadequate, burned in

May, 1900. It was decided then to ask the State for a sufficient appropriation to build a new structure, modern and up-to-date in every respect and large enough to accommodate the growing needs of the Departments of Physics and Chemistry.

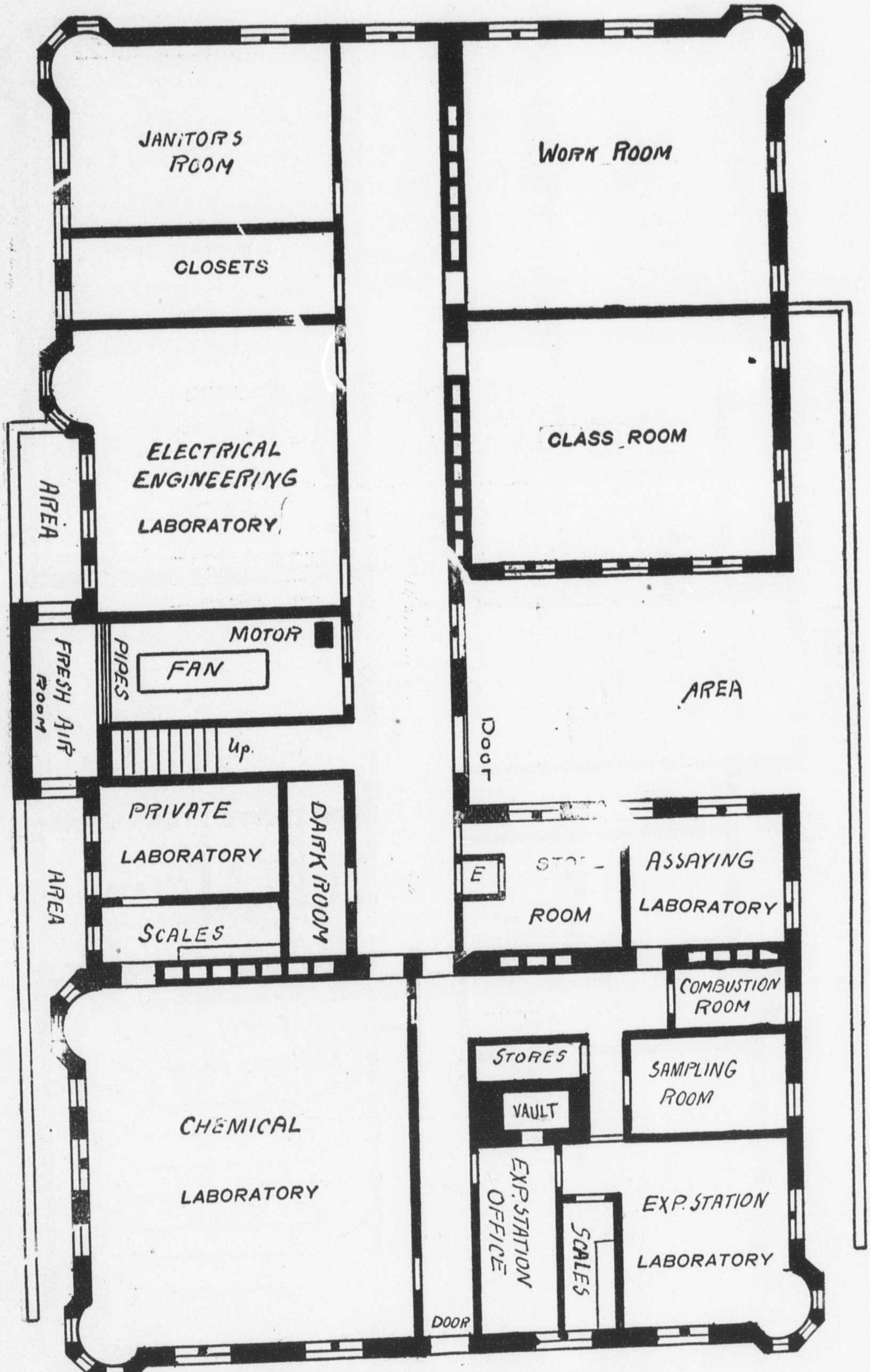
In the winter of 1900-'01 the State legislature was asked for $70,000 for this purpose and, thanks to the many good friends of the College having a voice in that body, the appropriation was



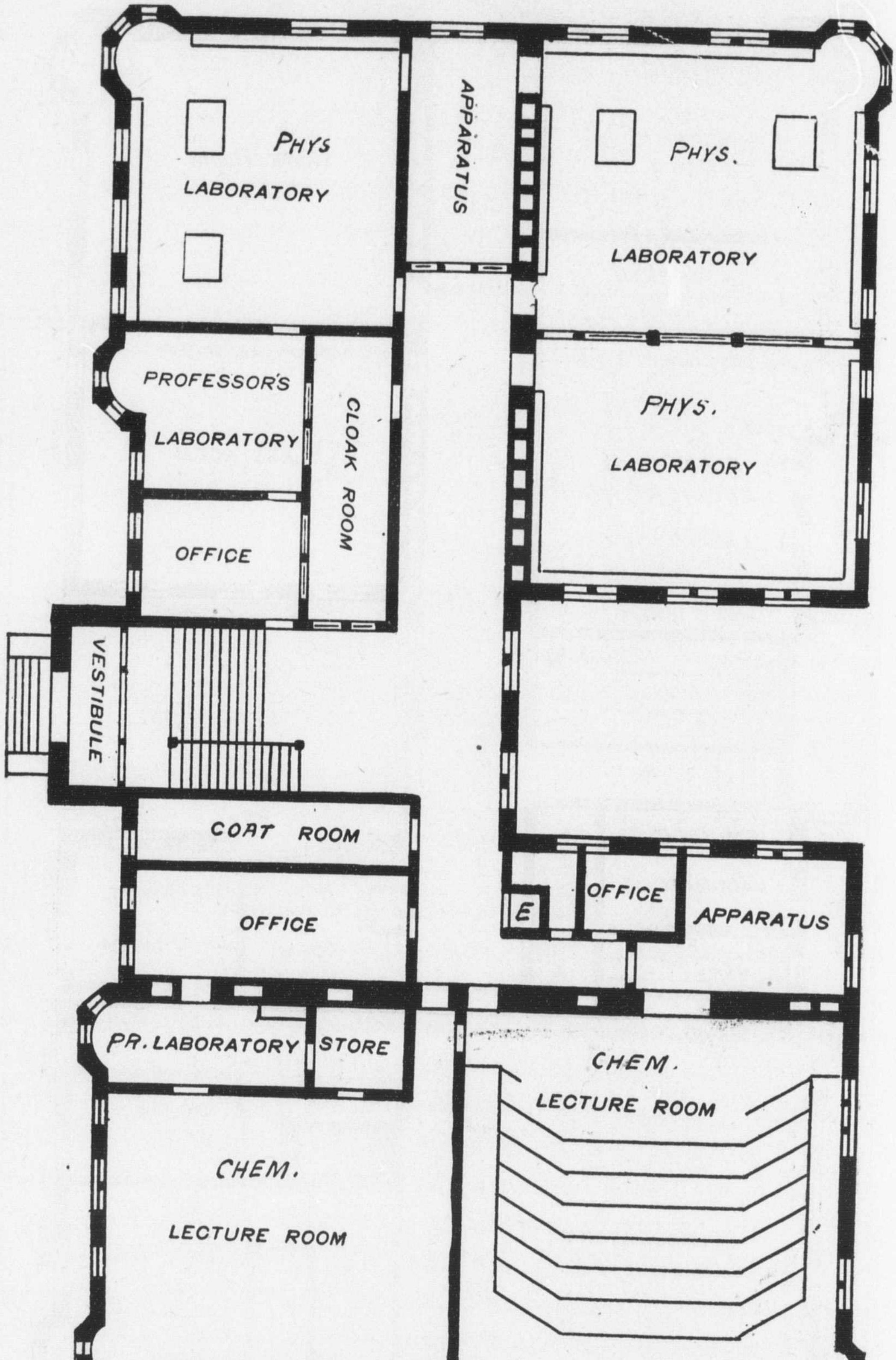
PHYSICAL SCIENCE HALL.

made without a dissenting vote. Architect Haskell, of Lawrence, who had planned a modern chemical building for the State University, was asked to prepare the plans and specifications, and the building was given in contract to C. A. Fellows, of Topeka, a builder of wide reputation and experience. The stonework was subcontracted by him to an alumnus of the College, Mr. J. W. Berry, of Jewell City, Kan. The heating and ventilating contract was awarded to Graeber Bros., of Lawrence, and Prof. J. D. Walters, of this College, was made building superintendent. Under the watchful care of the professor and of President Nichols the new building grew, stone by stone and beam by beam, until it stands to-day a model of solid comfort and usefulness, a model of its kind in America.

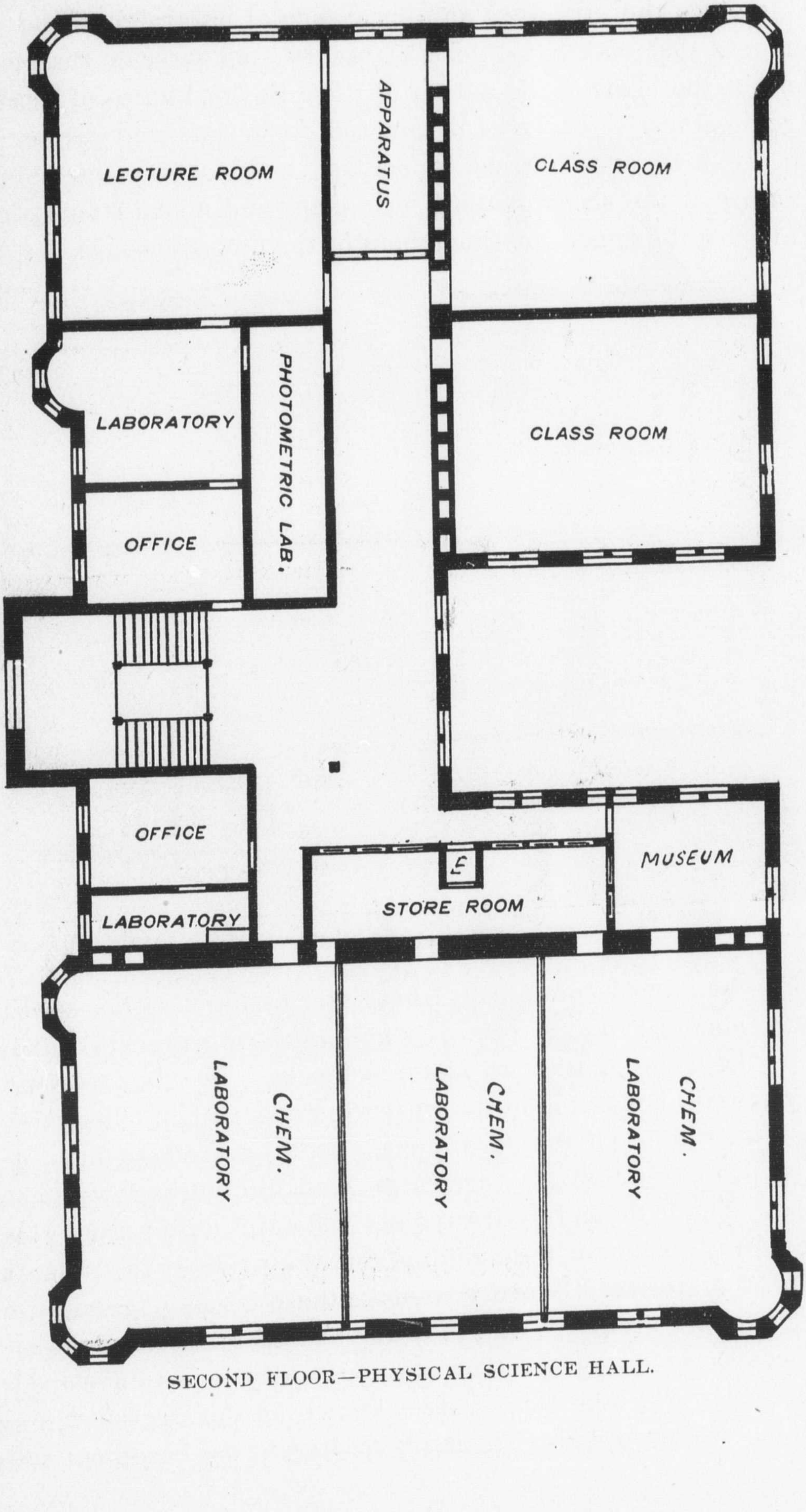
The new Physical-Science Hall is built of rough-dressed range work of Manhattan limestone, one of the finest building stones in existence. The ranges measure from two feet to eight inches in thickness, and there are no bushhammered surfaces except the



BASEMENT FLOOR—PHYSICAL SCIENCE HALL.

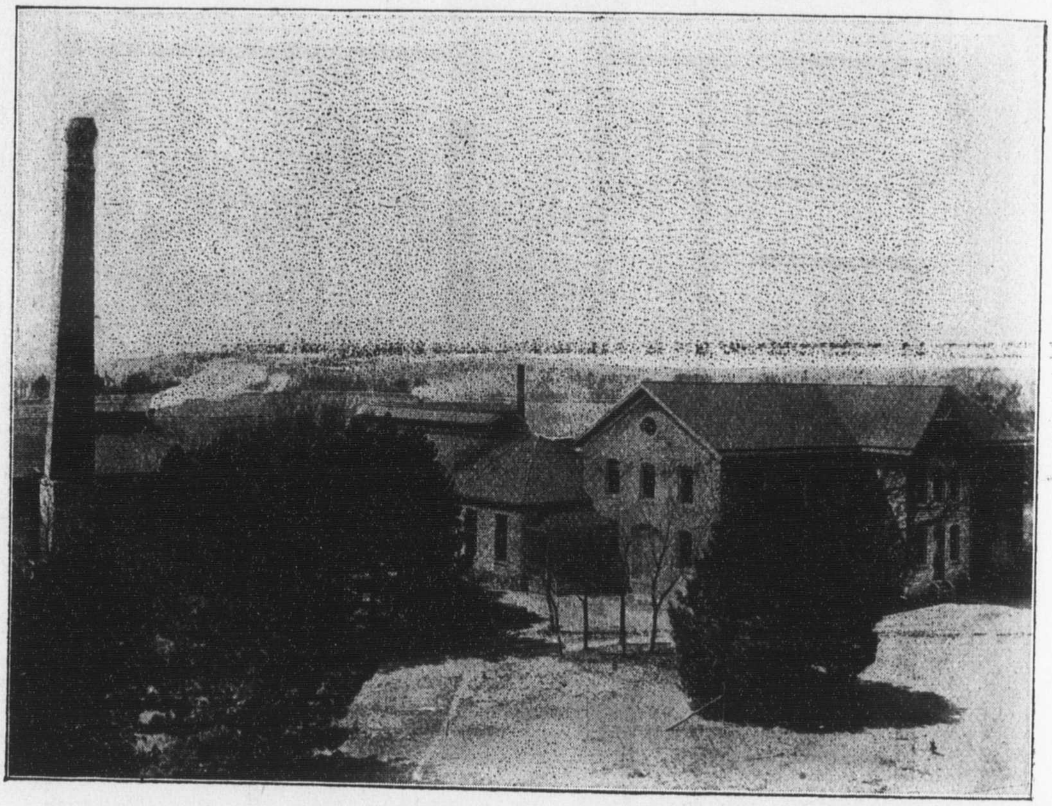


FIRST FLOOR—PHYSICAL SCIENCE HALL.



SECOND FLOOR—PHYSICAL SCIENCE HALL.

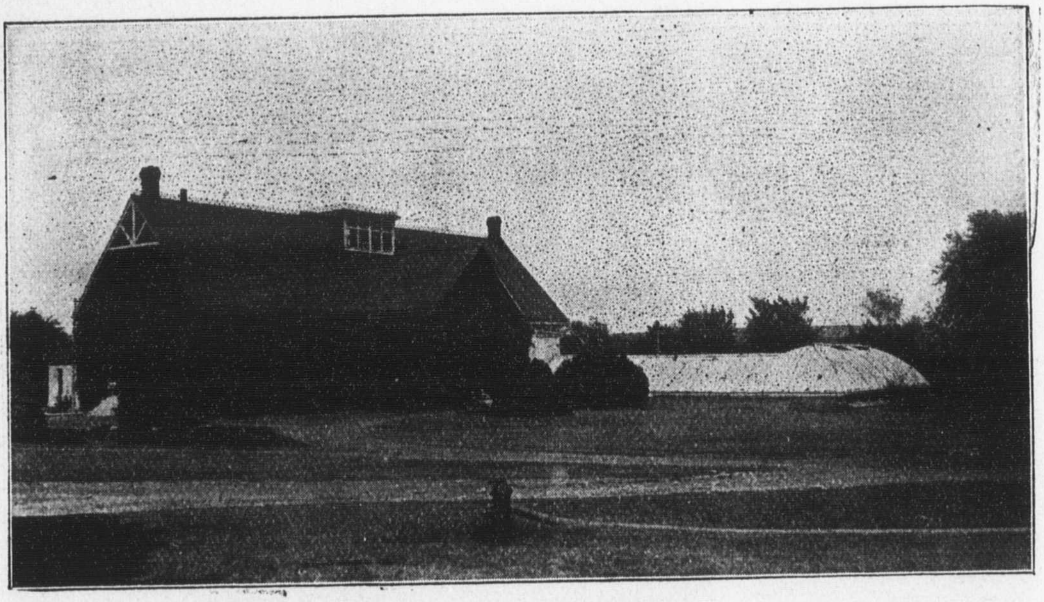
inner sides of the jambs and a few belt courses under the cornice. This gives the structure an appearance of naturalness and ruggedness that makes it a thing of beauty—an exterior that might delight the heart of the author of "The Seven Lamps of Truth in Architecture." The roof is covered with slate and copper and the ceilings are finished in neutral wood under varnish. A glimpse at the accompanying floor plans and a small perspective will show the general arrangement of the new structure.



MECHANICS HALL.

The building is practically three stories high, with a subbasement (plenum) and an attic. Its general form suggests that it is to be the home of the two sister sciences. The Department of Physics will be located in the west wing and that of Chemistry in the east wing. Of the several class rooms and offices little need be said, except that they are large, well lighted and well ventilated. The halls and stairways are wide and direct, giving easy access to all parts of the building, but the pride of the structure is its laboratories. In order to make these rooms hygienic workshops for the students, *i. e.*, in order to free them from the more or less poisonous gases that are constantly being developed in chemical work, a heating system known as the electric fan system has been adopted. The fan is located in the basement story,

directly under the entrance hall. It is a neat piece of mechanism of a radius of about eight feet, driven by an electric motor that receives its power from the large dynamo in the central heating plant. The air passes into this fan from the cold-air chamber, and having been heated to any desirable temperature by being forced through a battery of steampipes, the fan forces the warm air under the floor of the basement into the air-tight space called plenum, from whence it ascends the flues of the heavy division walls (see drawings) into the different class rooms, laboratories,

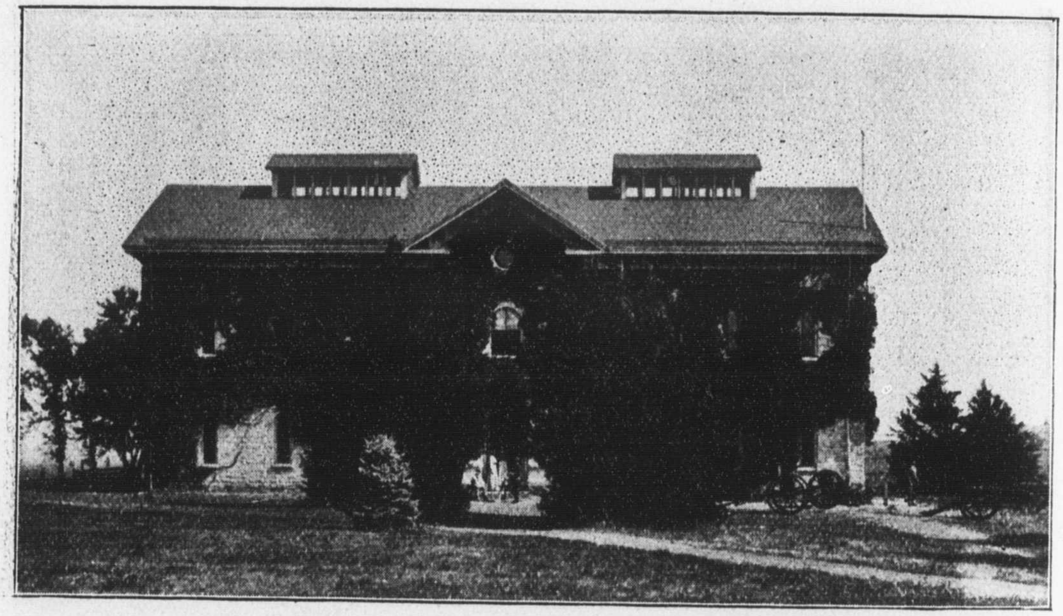


HORTICULTURAL HALL.

and offices. A single mechanism in each flue regulates the rapidity, *i. e.*, the quantity of the flow. The exit provisions for the foul air in the class rooms and offices are flues of the usual capacity, with register openings near the floor. In the laboratories, however, the exit is divided into small flues built of ten-inch tiling and distributed all over the wall space of the rooms wherever the tables for analytical work may be located. Hoods gather the produced gases and lead them into these flue openings. In the fall and spring the electric fan furnishes cool air in place of warm. It is expected that with these provisions for ventilation the large chemical laboratories of the basement and second floor will become wholesome workshops for all concerned.

The three floor plans printed with this article represent the three floors of the new Physical-Science Hall. The building stands about seventy feet east of the old chemical laboratory and forms a part of a great semicircular court of buildings consisting

of the Library, the Main College Hall, the Physical-Science Hall, and the Agricultural Hall. The basement of the east wing is altogether above ground and will be used for advanced work and Experiment Station work. A glance at the plan will make clear this statement. In the basement of the west wing, which is partly below the surface, will be located a large dynamo laboratory, a classroom, a workshop for the construction of physical apparatus, a janitor's room, and the boys' toilet-room. In the center under the main entrance is the electric fan operated by a



ARMORY AND VETERINARY SCIENCE.

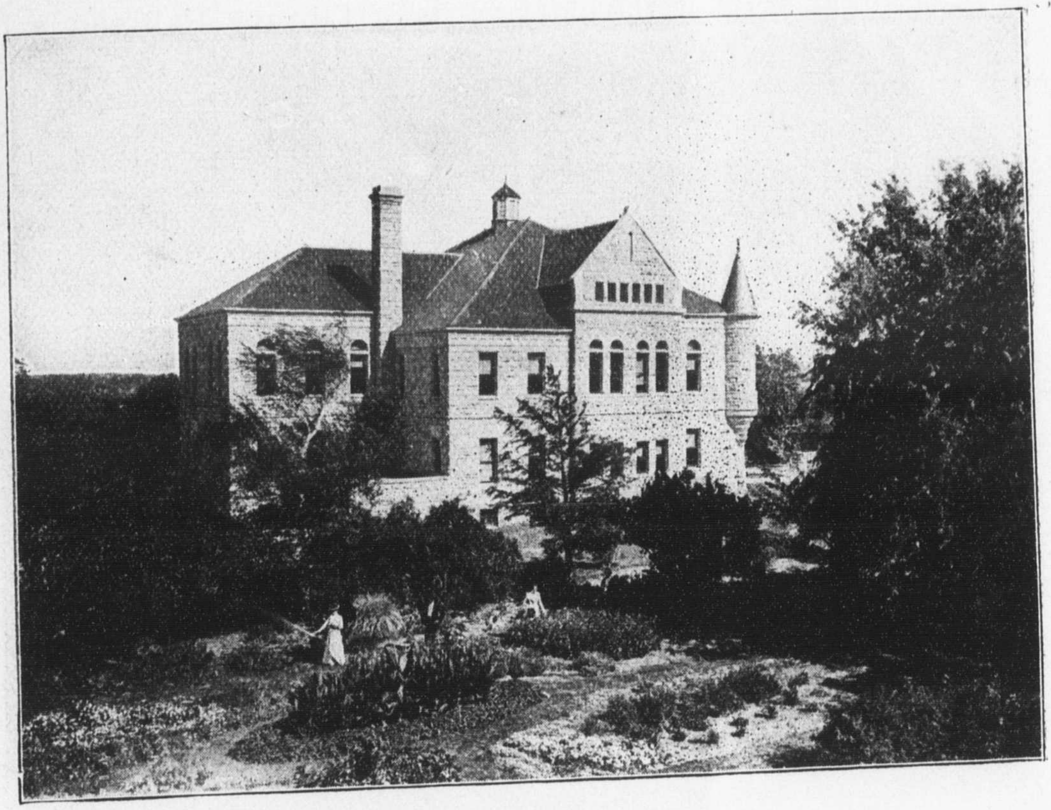
motor. An elevator connects this floor with the floors above and the attic.

On the main floor, which is reached by a short flight of front steps and short vestibule stairs, are located, on the east side, two large lecture-rooms and several apparatus rooms, offices, and a professor's laboratory. The large lecture room will accommodate over a hundred students and has its seats arranged in terraces so that all will be able to observe the experiments performed by the lecturer. A large passage with an overhead ventilator connects this room with the preparation room. In the west wing are the main office of the professor of physics, a large private laboratory, and three laboratories for students in physics. Here is also located the cloak-room and toilet-room for the girls.

On the second floor, east side, are three large analytical laboratories for students, separated by light glass partitions. These

partitions are hung with weights so that they can be raised and the whole wing converted into a single room. On the west side are three large class rooms or lecture-rooms, while the middle parts are occupied by a photometric laboratory and several offices and assistants' laboratories.

The attic does not contain any finished rooms, but provision has been made to partition and plaster a part of it for a meteoro-



AGRICULTURAL HALL.

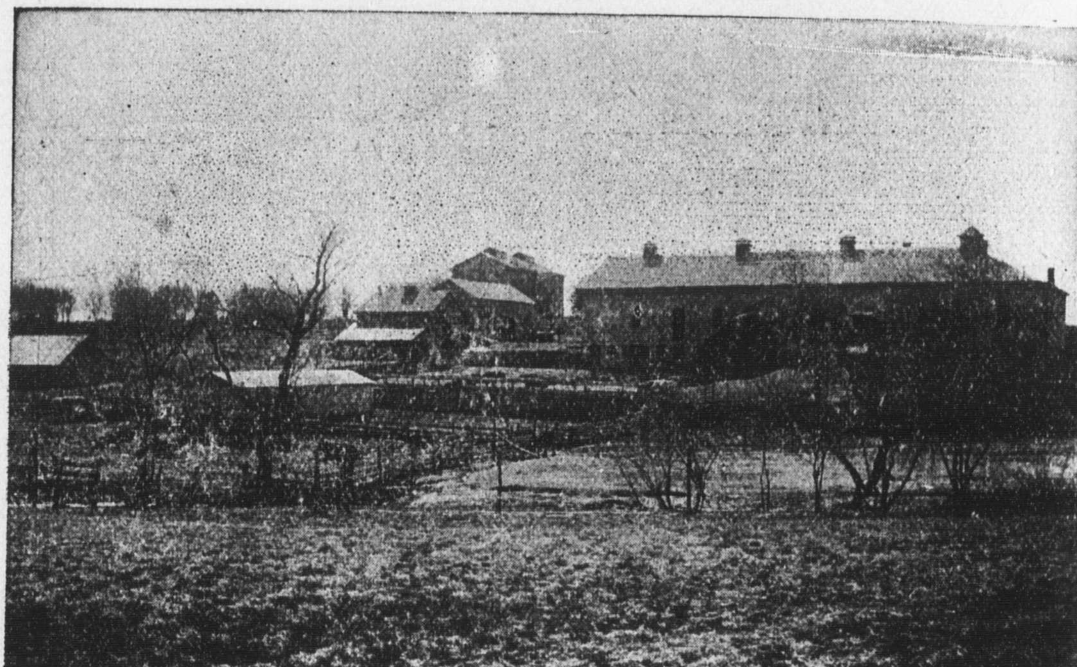
logical office, an Experiment Station mailing room, and a store-room for bulletins.

Altogether the new Physical-Science Hall is a model of a college building, probably the best and most economical structure of its kind in America. The Departments of Physics and Chemistry are well housed and the College may now think of providing other departments that have no home of their own but are forced to shift from room to room every term and sometimes every hour in the day.

Addition to the Library.

Another substantial addition to the group of buildings "on the hill" is the extension of Library Hall, which is now well under way and will be completed by the opening of the next fall term. The plans contemplate an addition, to the north of the present

office of the librarian, of a reading-room, 42 by 56 feet, with an entrance from the west and a corridor connecting it with the stack-room. The new wing and the whole of the present west part of the building will be made two stories high. The upper floor will contain a class room and a very fine laboratory for the rapidly growing work in bacteriology, a class room for the classes in zoölogy, and three roomy offices. The addition will be built in the substantial style of the older parts of Library Hall and will



BARN.

complete its exterior architectural appearance. The plans and specifications were prepared by Prof. J. D. Walters, who is also superintending the construction. Mr. Herman Schubert, of Manhattan, is the contractor of this building, and to judge from his previous work in and around the city he will give us a good job. The contract amount, exclusive of heating and plumbing, is $9,955.

Other Improvements.

Among the many other improvements in the line of building may be mentioned the construction last summer of a cattle shed 20 by 250 feet, between the old barn and the new dairy stables. South of this shed is a new corral for blooded stock, built of ten-foot white oak posts and Paige continuous bull wire netting. This improvement has cost something over $500. Several smal-

ler sheds and poultry houses have also been added to the building equipment of the farm and live-stock departments, and a number of substantial sheds will be constructed next summer.

The Girls' Gymnasium.

A very valuable addition to the facilities of the College was the completion of the Girl's Gymnasium, which was built on the

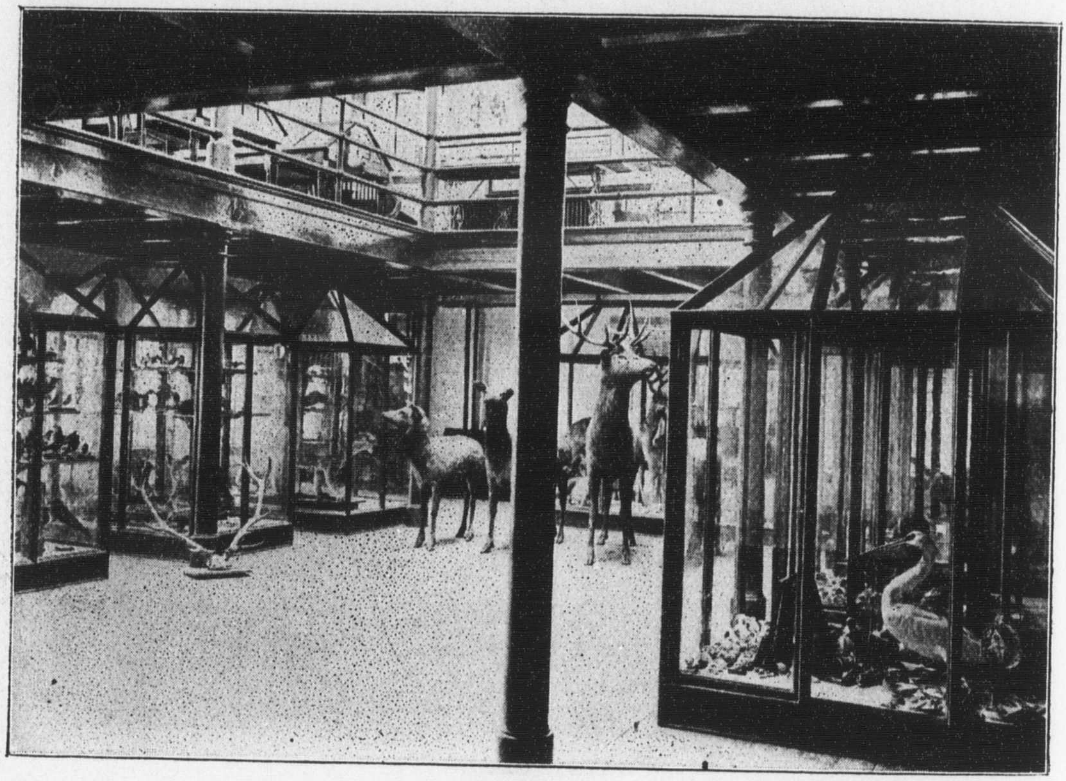
DAIRY CLASS.

walls of the old Chemical Laboratory, and for the construction of which the last legislature made an appropriation of $5,000. It is the general verdict that the new structure looks better interiorly and exteriorly than did the old one, and that the young women of the College now have one of the neatest and best equipped gymnasiums of the country. The main drill hall measures 42 by 72 feet and has a height of 26 feet. It is well lighted, and heated by direct and indirect steam heat. The building contains a large dressing-room provided with lockers, a bath-room with eight spray baths and two tub baths, four water-closets, two offices, a class room, a cloak-room, and an apparatus room. The whole is lighted by electric light, and it should be stated incidentally that the work of heating and lighting of the structure was done by the apprentices of the workshops, under the direction of Engineer

Lund. The plans and specifications for the building were made by Prof. J. D. Walters.

Imperative Needs.

The foregoing lines enumerating some of the items of a long list of substantial improvements do not imply that the Agricultural College has no imperative needs to be provided for. The institution is growing, and this growth must be met by enlargement of facilities in every single department. An average growth of one

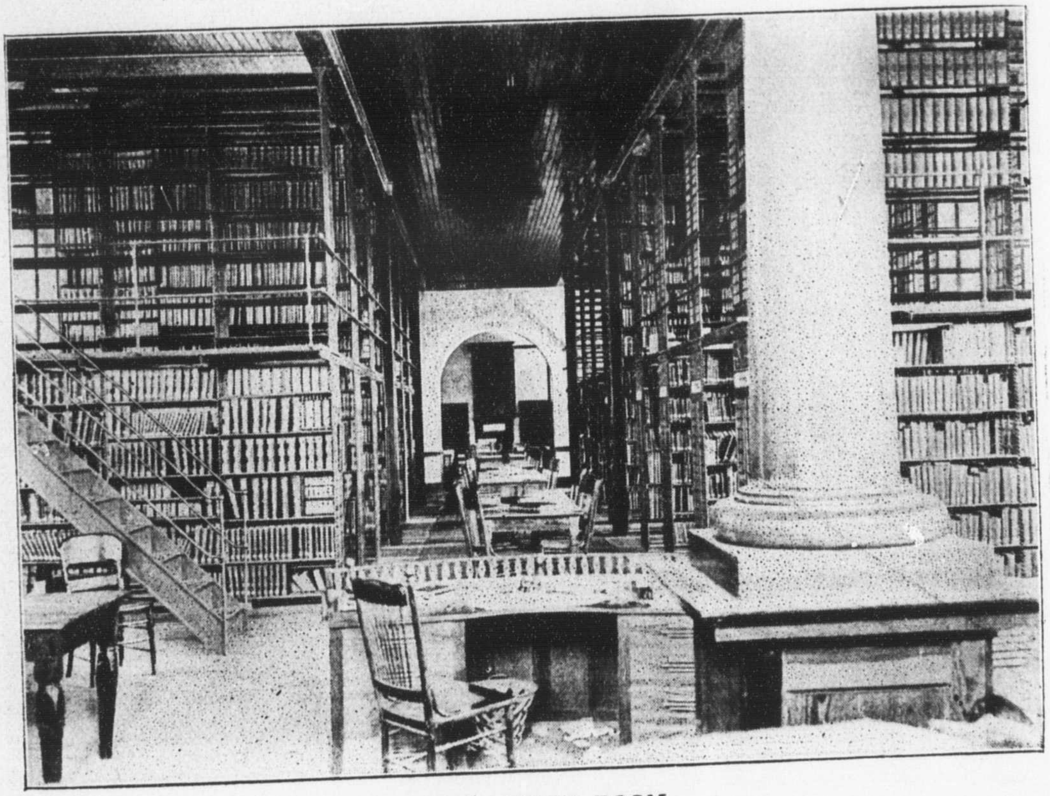


MUSEUM.

hundred students in a public school would mean the building of four new class rooms and a corresponding number of new cloakrooms and teachers' offices; it would mean the addition of four teachers to the teaching force, more superintendents, more janitors, more heating, more library, etc. In a modern technical college the necessary means per student are much greater. To the additional schoolrooms must be added expensive laboratory rooms and shop rooms. It means more scientific apparatus, more illustrative material, more tools of a costly kind, larger halls, more executive provisions of many kinds. It requires the hiring of teachers who are experts in special lines of work—teachers who have experience in giving advanced instruction, and such teachers

are difficult to find. In short, it means the expenditure of a large amount of funds and directing energy.

The College is greatly in need of a new Horticultural building, with enlarged greenhouses, experimental pits, and an aquarium. It needs a new armory and gymnasium for the boys, the present room in the "old barn" being inadequate and greatly needed by the Veterinary Department. It needs large additions to its stables, so that the different breeds of farm animals may be prop-



BOOK STOCK ROOM.

erly and safely housed. It needs a roomy addition to its Agricultural Hall, for dairying purposes. It needs a new assembly room that will seat all its present students and employees and will enable it to invite a thousand guests to attend its public gatherings. It needs better facilities and larger quarters for many of its other departments, especially the departments of Industrial Art and of Music. It needs more machinery, more tools, more apparatus for its shops and laboratories, and more, many more, books for its library. These things will have to be provided if the College is to grow in the future as it has grown in the past and is growing now.

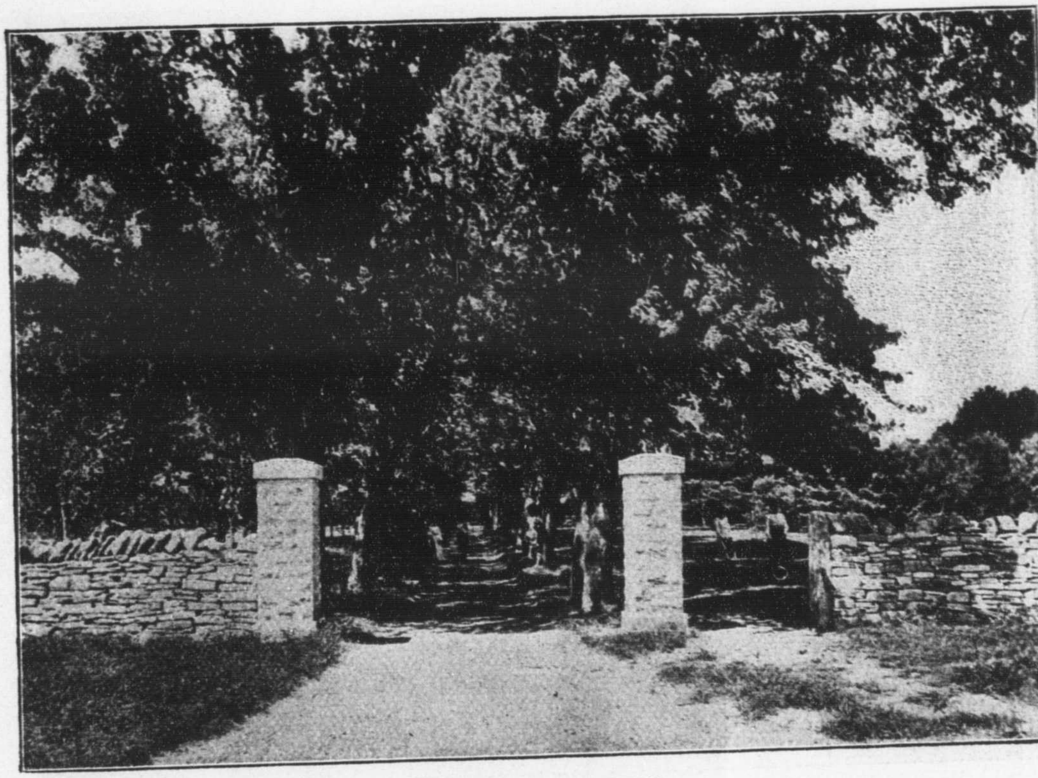
The needs of the Experiment Station, the necessary extension of the campus, and the increase of illustrative live stock have been such of late that the present farm of 320 acres is inade-

quate. During the past few years the College has rented adjoining plats to the extent of 210 acres, but the rapid growth of the city and its suburbs will make it impossible to depend on renting any longer. The next legislature should assist the College in acquiring at least half a section of additional farm land.

The list of needs includes also a larger teaching force. Most of the members of the Board of Instruction are overworked. Better work could be done in many instances by these heroic men and women if their hours and the size of their classes could be reduced. The salaries are inadequate—not nearly what other institutions of like grade are paying to teachers of like standing and experience. For years the College has been unable to compete in the "scientific market" with other agricultural schools, and had to see one after another of its most energetic and most experienced teachers leave for eastern or western centers of learning. This is not as it should be. The State of Kansas is fully able to meet the just claims of its most characteristic school. It should not haggle over the few dollars asked biennially by the Board of Regents. It should say: What can you do for us at your school at Manhattan, and how much do you need to do it well? How much can you use to advantage?

MAIN ENTRANCE.

The agricultural interests are the main interests of the State. Talk about gold mines and then compare the output with that of our glowing prairie farms. The Kansas crops of a single year amount to more than the output of gold of most of the states will amount to in a century. The farm home is the cornerstone of our national life, and no education is too good for the tiller of the soil and his helpmate. *Ad astra per aspera.*



"LOVERS' LANE"

Farmers' Institutes.

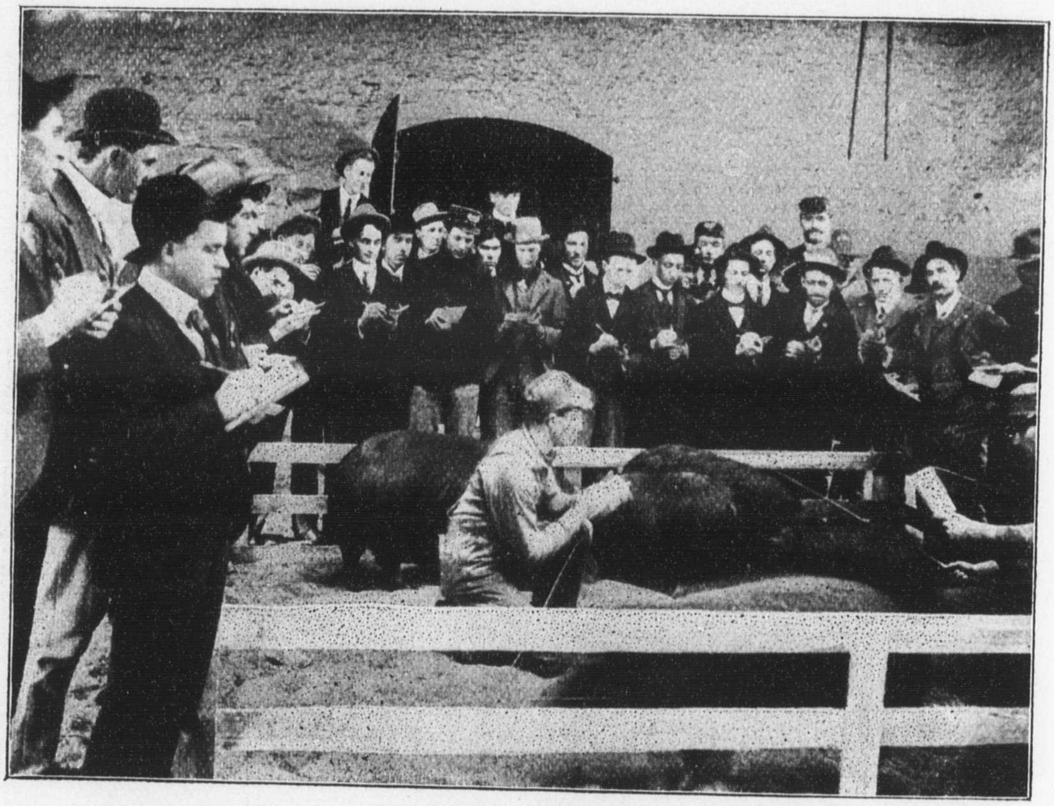
Similar progress has been made during the last half-dozen years in the farmers' institute work. The following table will show its increase during the past decade:

Year.	Number of Institutes.
1892-93	11
1893-94	17
1894-95	22
1895-96	22
1896-97	19
1897-98	30
1898-99	63
1899-00	136
1900-01	156
1901-02	102

The farmers' institute will not be permitted to rest. Arrangements have been made to begin the present summer work at once, as soon as Commencement stops the routine work of

the class room. Several institutes have been arranged for the month of June, thus bringing the number for the current year up to the average attained.

The average attendance at the farmers' institutes is constantly growing—a fact which speaks well for "both sides of the house," and members of the Faculty to whom this peculiar work has been delegated feel that they are laboring in a good cause. They feel



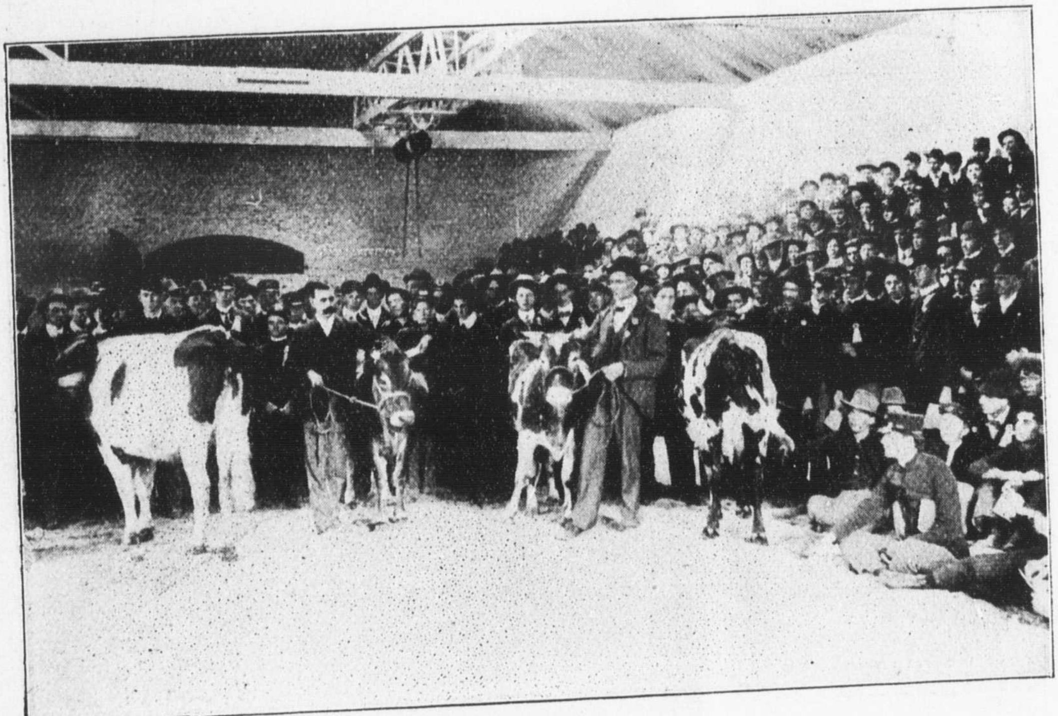
JUDGING SWINE.

that they are amply repaid for the hardships of traveling from city to city, by all sorts of conveyances, from June to December, and addressing audiences in all sorts of places under all kinds of conditions.

The following table gives the places, dates, speakers detailed by the College, and the estimated attendance, for all the institutes held during the present College year:

Date and Place.	Speakers.	Attendance.
July 17, Overbrook	H. M. Cottrell	2000
" 18, Lyndon	H. M. Cottrell	800
" 19, Oak Grange	H. M. Cottrell	100
" 20, Cadmus	H. M. Cottrell	4000
" 23, Arkansas City	H. M. Cottrell	350
" 24, Sibleyville	H. M. Cottrell	700
" 26, New Lancaster	H. M. Cottrell	100
" 26, Somerset	H. M. Cottrell	500

Date and Place.	Speakers.	Attendance.
July 27, Olathe	H. M. Cottrell	800
" 26, Courtland	J. D. Walters, E. A. Popenoe	350
" 31, Westmoreland	D. H. Otis, R. W. Clothier	1200
Aug 1, Cedarville	J. D. Walters, O. H. Elling	1000
" 2, Liverpool	H. F. Roberts	250
" 16, Jennings	H. M. Cottrell, Albert Dickens	500
" 16, Tonganoxie	F. D. Coburn, D. H. Otis	350
" 21, Burlingame	Albert Dickens, O. H. Elling	500
" 22, Acme	D. H. Otis, W. M. Sawdon	450



JUDGING DAIRY COWS.

Aug. 22, Highland Station	Albert Dickens	400
" 24, Union Center	J. D. Walters, A. T. Kinsley	350
" 24, White City	D. H. Otis, O. H. Elling	350
" 27, Berryton	D. H. Otis	1000
" 29, Portis	J. D. Walters	250
" 29, Angela	H. M. Cottrell	500
" 30, Americus	D. H. and Mrs. Otis	500
" 30, Leon	H. M. Cottrell	350
Sept. 5, Hays	H. M. Cottrell, D. H. Otis	2000
" 6, Herrington	E. A. Popenoe, H. F. Roberts	150
" 6, Little River	H. M. Cottrell	450
" 7, Dolespark	H. M. Cottrell	100
" 7, Garnett	J. D. Walters, D. H. Otis, M. Alexander,	450
" 11, Bendena	J. T. Willard, E. A. Popenoe	200
" 12, Winchester	D. H. Otis, G. O. Greene	700
" 13, Milton	D. H. Otis, G. O. Greene	175
" 14, Benton	D. H. Otis, G. O. Greene	75
" 18, Melvern	H. M. Cottrell, E. J. Agnew	150
" 19, 20, Ottawa	H. M. Cottrell, D. H. Otis, E. J. Agnew,	150

Date and Place.	Speakers.	Attendance.
Sept. 26, Chanute	Albert Dickens, F. E. Uhl	300
" 27, Elsmore	Albert Dickens, F. E. Uhl	500
" 28, Lone Elm	Albert Dickens, F. E. Uhl	500
" 28, Gypsum	A. T. Kinsley	250
Oct. 2, Blue Mound	J. T. Willard, V. M. Shoesmith	350
" 3, New Lancaster	J. T. Willard, V. M. Shoesmith	65
" 3, Hiawatha	H. M. Cottrell, J. D. Walters	75
" 4, Bucyrus	J. T. Willard, V. M. Shoesmith	200

MAIN DRIVE.

Oct. 5, Junction City	A. T. Kinsley, G. O. Greene	50
" 8, Denison	D. H. Otis, Mrs. H. Calvin	500
" 11, 12, Girard	D. H. Otis, Mrs. H. Calvin	300
" 16, Cunningham	D. H. Otis, Mrs. H. Calvin	150
" 17, Augusta	D. H. Otis, Miss E. McIntyre	50
" 18, Benton	D. H. Otis, Miss E. McIntyre	75
" 18, Admire	A. T. Kinsley, V. M. Shoesmith	400
" 19, Florence	A. T. Kinsley, V. M. Shoesmith	250
" 19, Douglass	D. H. Otis, Miss E. McIntyre	350
" 25, Bellflower Grange	N. S. Mayo, Albert Dickens	200
" 26, Clatawa Grange	N. S. Mayo, Albert Dickens	150
Nov. 9, Garrison	H. M. Cottrell, J. D. Walters	125
" 16, Junction City	H. M. Cottrell	10
" 19, Talmage	Albert Dickens, D. H. Otis	75
" 20, Glenelder	Albert Dickens, D. H. Otis	150
" 21, Jewell	Albert Dickens, D. H. Otis	250
" 23, Meriden	D. H. Otis, Margaret Minis	225
" 29, Rose Hill	D. H. Otis, J. D. Walters	126
Dec. 2, Mulvane	D. H. Otis, J. D. Walters	225

Date and Place.	Speakers.	Attendance.
Dec. 3, Caldwell	N. S. Mayo, Albert Dickens	15
" 3, 4, Hutchinson	H. M. Cottrell, Mrs. H. Calvin	80
" 4, Viola	D. H. Otis, J. D. Walters	75
" 4, South Haven	N. S. Mayo, Albert Dickens	50
" 5, Conway Springs	D. H. Otis, J. D. Walters	100
" 5, Belle Plainè	H. M. Cottrell	75
" 5, 6, Hackney	Miss Edith McIntyre, N. S. Mayo	250
" 5, 6, Burrton	Albert Dickens, Mrs. H. Calvin	150

LANE NORTH OF SHOPS.

Dec. 6, Oxford	N. S. Mayo, H. M. Cottrell	40
" 6, Belmont	J. D. Walters, D. H. Otis	70
" 7, Turon	J. D. Walters, Miss McIntyre, D. H. Otis,	75
" 7, Wellington	H. M. Cottrell, N. S. Mayo	60
" 9, Hazelton	J. T. Willard	21
" 11, Attica	J. T. Willard, F. E. Uhl	23
" 11, Argonia	J. T. Willard, F. E. Uhl	34
" 12, Anthony	J. T. Willard, F. E. Uhl	7
" 13, Harper	J. T. Willard, F. E. Uhl	23
" 14, Milan	F. E. Uhl	14
" 17, 18, Oak Grange	H. M. Cottrell, D. H. Otis	200
" 19, Indian Creek	H. M. Cottrell, D. H. Otis, Miss McIntyre,	100
" 18, 19, Burlingame	E. A. Popenoe, V. M. Shoesmith.	100
" 20, Michigan Valley	E. A. Popenoe, V. M. Shoesmith	150
" 20, 21, Oneida	D. H. Otis, Miss E. McIntyre	200
Jan. 4, Junction City	J. T. Willard	14
" 21, 22, Edgerton	A. T. Kinsley, Mrs. H. Calvin	250
" 22, 23, Berryton	A. T. Kinsley, Mrs. H. Calvin	250
" 22, 23, Seneca	J. T. Willard, E. A. Popenoe	140

Date and Place.	Speakers.	Attendance.
Jan. 29, 30, Stockton	J. D. Walters, A. T. Kinsley	300
" 31, Feb. 1, Overbrook	D. H. Otis, Mrs. H. Calvin	500
Feb. 1, Junction City	E. A. Popenoe	60
" 5, 6, Arkansas City	Miss E. McIntyre, A. T. Kinsley	250
" 6, 7, Vernon	Margaret Minis, Albert Dickens	150
Feb. 13, 14, Denison	E. A. Popenoe, Albert Dickens	50
" 19, 20, Marysville	J. T. Willard, E. A. Popenoe	60
Mar. 1, Junction City	H. F. Roberts	40
" 29, Russell	Albert Dickens	25
Apr. 4, 5, Tonganoxie	D. H. Otis	125
" 5, Junction City	H. F. Roberts	30
May 15, Union Center	H. F. Roberts, Mrs. H. Calvin	—

The Picnic Institute.

To do this greatly increased work without increasing the Faculty beyond the financial ability of the College, experiments were made in 1899 to hold summer picnic institutes. The results were so uniformly favorable that the vacation institute may now well be considered a fixture. In 1899–00 not less than 105 of the 136 institutes were held before September 30. In 1900–01 and 1901–02 the ratio of summer institutes as compared with those held in the other three seasons was about the same. The practical value of this work carried on with increased momentum in all parts of the State can hardly be overestimated. Applications are already pouring in from township after township for assistance in such work next summer, and clouds or sunshine, good harvests or poor harvests, the summer institute will go on and its influence will spread.

Similar statistics, positive and convincing like the foregoing, might be given with regard to other lines of growth. There is probably not a single land-grant institution in America that is accomplishing as much in agricultural lines of education as this College does. The farmers' school at Manhattan is doing a grand work and is doing it well.

The Experiment Station.

The work of the Experiment Station has been to a considerable extent in the lines of previous years. Owing to the extreme drought of last season, experiments in crop production were much interfered with, but opportunity was afforded for some valuable observations on drought-resistance. The scarcity of feed prevented carrying out many feeding experiments. The study of animal diseases, insect pests, the adaptability of forage

plants, vegetables and fruits, has been continued. The work in seed-breeding is believed to have made some progress, notwithstanding the fact that the corn was saved from total ruin only by application of city water. Determinations of the number of soil bacteria at different depths are in progress. A large orchard has been leased for five years on which experiments will be conducted.

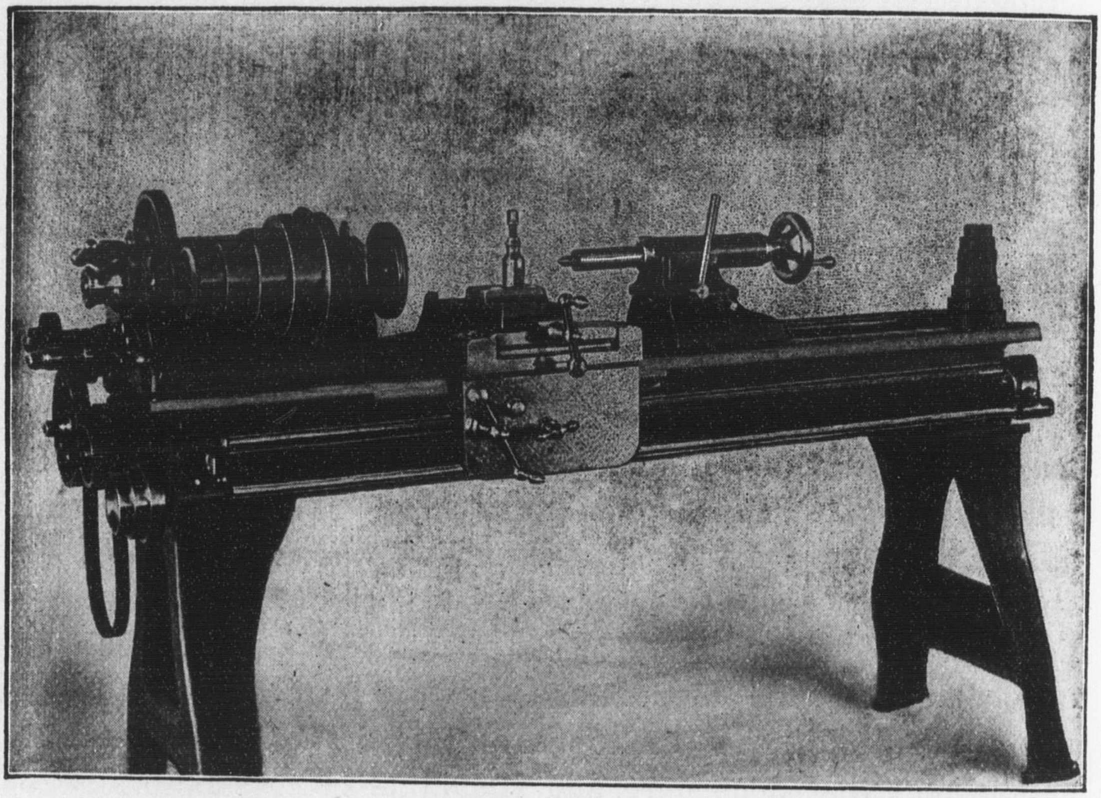
The Farm Department has been divided, the Department of Dairy Husbandry being split off from it. Horticulture and Entomology have been restored to the rank of separate departments. The organization of the Station proper remains otherwise unchanged, except for the changes in personnel. These have been far too numerous for the good of the work, but it is pleasant to know that they have all been caused by calls to better positions elsewhere.

An important development of the Station influence is found in the establishment of the Fort Hays Branch Station. This is upon the Ft. Hays military reservation which has been ceded to the State partly for the use of this Station, and the last legislature made appropriations of $3,000 per annum for its maintenance. On account of legal complications the work was not begun until this spring, and for some weeks the season was unpropitious, but since rains have come the prospects have brightened, and it is believed that even upon sod, as most of this year's experiments necessarily are, a good degree of success will be attained. It is confidently expected that the work of this branch will effectively supplement that done here, and should its success and value be pronounced it may lead to the establishment of others. The Hatch fund cannot be used for branch stations, but State appropriations will doubtless be forthcoming, in so far as results attained warrant them.

Investigations concerning methods for the extermination of prairie-dogs and gophers have been carried on the past year under the provisions of a law passed in 1901. These are under the general supervision of the Station, but the immediate direction of a special agent. Under the provisions of the law, poison has been furnished at cost to township trustees, and as a matter of accommodation to others within the State. In the preparation of this poison 6064 ounces of strychnine have been used. The results in the destruction of prairie-dogs have been eminently satisfactory, and now that the possibility of destroying these pests has been

shown on so large a scale, it is probable that the people will continue and extend their efforts in this direction.

The publications for the year include the annual report, six bulletins, and twenty-five press bulletins. Three other bulletins are ready but their printing is delayed on account of lack of funds, and several others could be put on the press at short notice. These will probably appear during the summer. A brief summary of the publications follows:



LAYTHE BUILT BY STUDENTS.

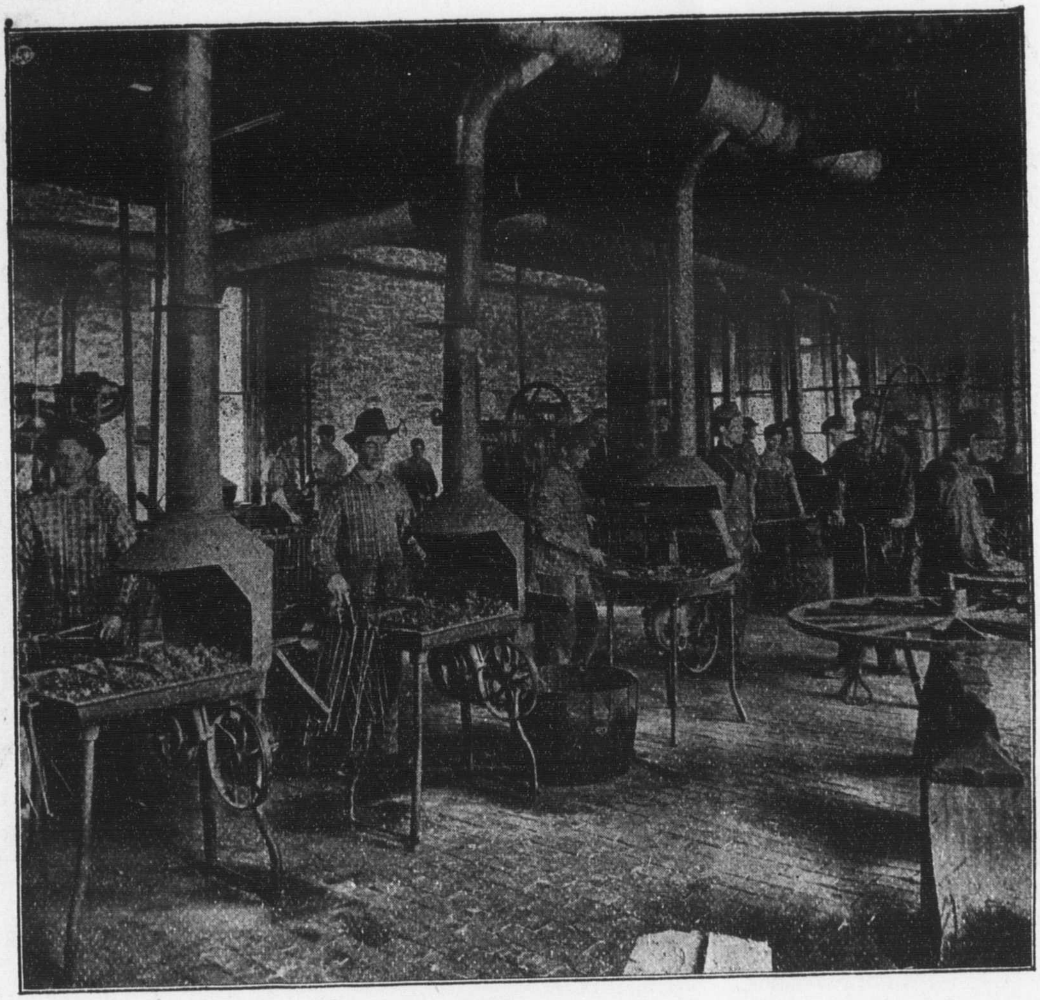
Fourteenth Annual Report, 1900-01. This contains the financial statements, a report of the Council upon the work of the several departments outlines of Bulletins Nos. 99 to 104, a list of Press Bulletins Nos. 71 to 92, a list of the previous publications of the Station, and an index to the bulletins for the year. Only three thousand copies were issued, as the publication is not designed for extended distribution. Copies will be sent to those applying for it, while a supply remains available. The index is a convenience to those who preserve the bulletins.

Bulletin No. 104.--Fall Seeding of Alfalfa. This gives practical directions for the preparation of the soil, and for the seeding of alfalfa in the fall.

Bulletin No. 105.—Blackleg in Kansas. This bulletin contains

a detailed description of blackleg, a history of investigations concerning means of preventing it, and an account of the investigations at the Station in connection with this disease.

Bulletin No. 106.—The Experimental Apple Orchard. The orchard was planted in 1891 as a test of varieties, and of whole-root and piece-root grafts. The bulletin gives the results to date.



BLACKSMITH SHOP.

Bulletin No. 107.—Analyses of corn with reference to its Improvement. The analyses detailed in this bulletin have extended over four years, and indicate marked possibilities in corn improvement.

Bulletin No. 108.—The Hardy Catalpa. This bulletin contains an account of the results observed in catalpa plantations on the College farm first made in 1872, and a large amount of information concerning the practices of other planters of this tree, and in regard to its utility as post and tie timber.

Bulletin No. 109.—Spontaneous Combustion of Alfalfa. An

account of a number of instances of spontaneous combustion of alfalfa which took place near Manhattan last year, suggestions as to its cause and the means of preventing it.

Of the first three bulletins named above 25,000 copies each were printed; of the last three, 27,000. The mailing list is constantly increasing, the bulletins being sent to all who apply for them. Bulletins are not sent out in bulk for distribution, however, as it is believed that that which comes without effort is usually regarded as of little value. On receipt of names for that purpose, sample bulletins will be mailed accompanied by return cards upon which application may be made for future issues.

The Press Bulletins issued are named below. These are not sent to all applicants, but are sent to all the papers of the State, to several classes of officers, and to certain other addresses where they will receive special publicity. These are very widely reprinted:

No. 91.—The Clover-hay Worm. Entomological Department.
No. 92.—Cow-peas as a Second Crop. Farm Department.
No. 93.—Baby Beef. Farm Department.
No. 94.—Three Ways of Feeding Milk to Calves. Farm Department.
No. 95.—Skim-milk Calves in the Feed Lot. Farm Department.
No. 96.—Feeding Wheat. General Department.
No. 97.—Inquiries Concerning Prairie-dogs and Gophers. General Department.
No. 98.—What shall we Feed? Farm Department.
No. 99.—Fall Seeding of Alfalfa. Farm Department.
No. 100.—Sorghum Pasture for Dairy Cows. Dairy Husbandry Department.
No. 101.—The Hessian Fly. Entomological Department.
No. 102.—Maintenance Ration for Cattle. Dairy Husbandry Department.
No. 103.—Grain Weevils. Entomological Department.
No. 104.—Cattle Distemper. Veterinary Department.
No. 105.—Sore Mouth of Cattle. Veterinary Department.
No. 106.—Profit in Maintaining the Milk Flow. Dairy Husbandry Department.
No. 107.—Cerebritis or "Staggers" in Horses. Veterinary Department.
No. 108.—Destroying Prairie-dogs. General Department.
No. 109.—Destroying Pocket-gophers. General Department.
No. 110.—Corn Improvement. Chemical Department.
No. 111.—Onion Notes. Horticultural Department.
No. 112.—Pneumonia in Cattle. Veterinary Department.
No. 113.—Pasture Weeds, Their Prevention and Eradication. Botanical Department.
No. 114.—Whole Kafir-corn Compared with Ground Kafir-corn for Young Calves. Dairy Husbandry Department.
No. 115.—Contagious Sore Eyes in Cattle. Veterinary Department.

Last April the Veterinary Department obtained a sheep from a herd that was infected with fringed tapeworm, "taenia fimbriata," and have been experimenting to find some remedy that would cause the expulsion of the parasite. The experiment closed by slaughtering the animal and holding a post-mortem examination, which revealed the tapeworm in the gall bladder and duct, and duodenum.

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.
Manhattan, Kansas.

PRES. E. R. NICHOLS..........Editor-in-Chief
PROF. J. D. WALTERS..........Local Editor
PROF. J. T. WILLARD..........Alumni Editor

LOCAL NOTES.

The carpenter shop has just completed a new model writing-desk for Mrs. J. R. Young, of the city.

Professor Walters will deliver an address to the country graduates of Oak school near Manhattan, June 21.

Professor Walters will deliver a lecture before the chautauqua assembly at Wathena, on Farmer's Day, August 13.

The two handsome desks in Professor McCormick's office were built by Foreman House and his classes in woodwork.

Forty head of pure blood cattle will be on exhibition in the stock judging room of the College barn on Commencement day.

During the summer vacation the Veterinary Department expects to carry on experiments with the blackleg toxin.

Parties who wish to inform themselves of the work of the Agricultural College should write to President Nichols for a copy of the annual catalogue of 1901-02.

The farmers' institute department has made arrangements for ten Grange institutes during the month of July. Requests for institutes are coming in every week.

The Mechanical Department is setting up and polishing the old upright eight horse-power engine formerly stationed as a drawing model in the Department of Industrial Art.

President and Mrs. E. R. Nichols entertained the members of the senior class Wednesday evening at their home, corner of Poyntz and Juliette avenues. All report a good time.

During the present college year the Agricultural College has used 3,945,000 pounds of coal—444,000 pounds less than last year. The mild winter has been a saving to us in several ways.

The annual baseball game between the Faculty and seniors came off last Monday afternoon, at Athletic Park, and ended with an inglorious defeat for the former. The score stood 3 to 18.

The city council of Manhattan has asked Professor Walters to prepare preliminary drawings and estimates for a new city hall in order to place the matter of building before the voters and call a bond election. Manhattan is preparing for a boom.

During Commencement week the Department of Industrial Art will exhibit samples of the work of the different classes, in Professor Walter's drafting room. The exhibition will contain over one thousand drawings of all kinds and will be worth visiting.

The soil experiments being carried on by the Veterinary Department are interesting, and they hope to have some valuable results for publication in the near future. So far it has been found that the poorer soils contain more germs than the richer.

Dr. W. M. Beardshear, of Ames, Iowa, who will deliver the annual address at Commencement this year, is president of the Iowa State Agricultural College and president of the National Educational Association. He is a clear thinker and a forceful lecturer, and to hear him will be a treat.

Among last week's visitors were R. A. Pearson, of the dairy division of the bureau of animal industry, and C. E. Gray, of the agricultural chemistry department of the Iowa Agricultural College. Both of these gentlemen expressed themselves as highly pleased with the institution. As usual, too, they were surprised.

The lawn party given to the Faculty and their families by Professors Brown and McKeever last Monday evening was a grand success. The evening was perfect. The College band played their best selections, the declamations and solo pieces were well rendered, the refreshments were delicate and the whole company happy.

Assistant Kinsley was out on Cedar Creek, Tuesday, where he vaccinated twenty calves as a test on blackleg vaccine being sent out by the Veterinary Department. As a rule vaccination for the prevention of blackleg in cattle is a success; occasionally an animal will die from the effects of vaccine, as it is impossible to make a vaccine that will meet the requirements of each individual animal.

Mrs. Nellie Kedzie-Jones, a former resident of the first ward, will receive an ovation from her old-time friends on her arrival and appearance here on the 16th inst. She will address the citizens of Topeka on a subject very familiar to herself, "Domestic Science," and a crowded house should hear it and get help on the house-maid problem. Rev. C. M. Sheldon and Mrs. Thorp have a part in this meeting.—*Topeka Journal.*

The Mechanical Department has ordered an 8x8 belt-driven air-compressor of the latest type, with a suitable receiver, of Ingersol-Sergeant Drill Company. This will be installed in the engineering laboratory for experimental purposes and to supply pneumatic tools to be added later. The capacity is of sixty-nine cubic feet of air per minute at a speed of one hundred fifty revolutions. The air is compressed to eighty-five pounds pressure per square inch.—*Students' Herald.*

Miss Harriet Howell, superintendent of Domestic Art, has resigned her position to accept the same chair in the Throop Polytechnic Institute, at Pasadena, Cal., where she will get a considerably increased salary, together with very acceptable duties. Superintendent Howell has been at the Kansas State Agricultural College since the fall of 1897 and leaves a host of friends, as well as an enviable record as a bright young lady and a hard and effective worker. We wish her success in her new work.

Professor Roberts has commenced a botanical survey of the region lying in the vicinity of St. George. This locality is the site of a terminal moraine of the glacier that once reached down into Kansas, and geologically is quite different from the region around Manhattan. The plant life there is especially interesting, because of the extensive swamp and the remarkable forest of the black-jack oak, probably the largest area in the State occupied by a single species of tree. The area to be studied will be charted on topographic maps, on which the zones of vegetation will be located. Students from the Engineering Department are coöperating in the line and topographic surveys.

The reception given at Hotel Gillett, Monday evening, by Miss Edith A. McIntyre, professor of domestic economy, and Miss Harriet Howell, superintendent of domestic art, was one of the most enjoyable affairs of its kind ever given in our city. The music, which was furnished by the College mandolin club, helped to make merry the evening. The refreshments were fruit punch and orange ice, the Misses Bessie Mudge, Alice Perry and Stella Fearon presiding at the punch bowls. The decorations of palms, potted plants and daisies added much to the beauty of the occasion. About one hundred guests responded to the invitation and all unite in voting it one of the most pleasant functions of the season.

The following weights and gains are those obtained from raising pure-blood calves on nurse cows. In addition to the milk, they were well supplied with grain and roughage.

Name.	Breed.	Age.	Weight, pounds.	Daily gain, pounds.
Barcola............	Angus............	120 days	328	2.133
Azelda............	Hereford..........	240 days	565	2.101
Aztec............	Shorthorn.........	210 days	568	2.33
Ayden............	Red Polled........	237 days	450	1.6

These calves will be on exhibition at the barn Commencement week.

Among the many employes of the College who are working and worrying year in and year out over the innumerable large and small details of the College household, and who are usually not thought of when total results are being counted, is the janitor. A janitor in an institution like this must be a species of perpetual motion and a man of judgment and common sense. He must be able to get along with the students, the members of the Faculty and the innumerable host of strangers who come here day after day for information or sightseeing; he must be able to direct the work of the large force of assistants needed to sweep and clean the acres of class rooms and offices; he must know how to make or direct repairs of all kinds from patching a carpet to mending an ice-cream freezer; he must have quick decision and unruffled politeness, etc., etc. Now, such a variegated individual is our present janitor, William R. Lewis; and may his shadow never get smaller nor shorter.

ALUMNI AND FORMER STUDENTS.

E. C. Cook and Emma Miller, both of the class of 1901, were married at the residence of the bride, Milford, Kan., Wednesday, June 4. 1902.

Philip Fox ['97], of this city, will receive the degree of B. S. in Chandler scientific course of Dartsmouth College this month. We congratulate Phil on his success. He will spend his summer in the East.—*Mercury.*

Geo. W. Finley, '96, has been elected to the chair of mathematics in the new school just started in Tonkawa, O. T. He will begin his work the first of September. He is now attending the State Normal School at Emporia.—*Nationalist.*

Rev. Chas. Campbell ['91] and wife, of Philadelphia, are here visiting his father, Rev. Wm. Campbell. He has accepted a call from the Twenty-third Avenue Presbyterian church of Denver, and is on his way to assume the pastorate of the same.—*Mercury.*

W. P. Tucker, '92 and Stella V. Kimball, '94, were married at the residence of the bride's parents Thursday, June 12. A large number of relatives and friends witnessed the ceremony. The young couple left for a few days visit with Mr. Tucker's family at Douglass, Kan., but will return for the alumni reunion. Mr. Tucker is cashier for the Avino Mining Co., Avino, Est. de Durango, Mexico.

The wedding of Louise Burnham [special student 1899] and H. H. Bowerman, of West Superior, Wis., was celebrated at high noon on Wednesday, June 11. The happy couple departed on the 1:22 Rock Island train, amidst the congratulations and good wishes of their many friends, for their future home in West Superior, Wis., where Mr. Bowerman, who is a rising young business man of that place, has built and furnished a handsome modern home for his bride. They take with them the kindest wishes of a host of friedns who have known and loved the bride all her life, and bespeak for them a full measure of conjugal happiness.—*Nationalist.*

C. D. Montgomery, '00, died at Palo Alto, Cal., June 1, 1902, of Bright's disease. This news was a great surprise even to those who knew of his illness, as he was thought to be improving. He had been ill some time, but it is thought he would have recovered but for over-study last winter. Mr. Montgomery was taking the law course at Leland Stanford Jr. University, and if his health had not failed would have completed it this year. He was one of the brightest students that we have ever had here, and in his death a promising career is cut short. He served in the Twenty-second Kansas during the Spanish-American war. Returning to College on being mustered out, he was put in charge of the Military Department of the College, and conducted it with credit to himself and the institution. The cadets have never received higher praise for the excellence of their drill than that given them while under Major Montgomery's instruction.

TERMS AND VACATIONS.

Fall Term, 1902, Thirteen Weeks.

WEDNESDAY, SEPTEMBER 17.—Examination for admission, at 9 A. M.
THURSDAY, SEPTEMBER 18.—College year begins.
TUESDAY, SEPTEMBER 30.—Short course in domestic science begins.
SATURDAY, NOVEMBER 1.—Mid-term examination.
THURSDAY AND FRIDAY, DECEMBER 18, 19.—Examination at close of term.

Winter Term, 1903, Twelve Weeks.

MONDAY, JANUARY 5.—Examination for admission, at 9 A. M.
TUESDAY, JANUARY 6.—Winter term begins.
TUESDAY, JANUARY 6.—Short courses in agriculture, horticulture and dairying begin.
SATURDAY, JANUARY 24.—Annual inter-society oratorical contest.
SATURDAY, FEBRUARY 14.—Mid-term examination.
THURSDAY AND FRIDAY, MARCH 26, 27.—Examination at close of term.

Spring Term, 1903, Eleven Weeks.

MONDAY, MARCH 30.—Examination for admission, at 9 A. M
TUESDAY, MARCH 31.—Spring term begins.
SATURDAY, MAY 9.—Mid-term examination.
TUESDAY AND WEDNESDAY, JUNE 16, 17.—Examination at close of year.
JUNE 14 TO 18.—Exercises of commencement week.
THURSDAY, JUNE 18, AT 10 A. M.—Commencement.
JUNE 19 TO SEPTEMBER 16.—Summer vacation.

Fall Term, 1903.

WEDNESDAY, SEPTEMBER 16.—Examination for admission, at 9 A. M.
THURSDAY, SEPTEMBER 17.—College year begins,

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Manhattan.

*Term expires.

Volume 28. Number 33.

THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE
AGRICULTURAL COLLEGE

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EDITOR-IN-CHIEF, PRES. E. R. NICHOLS
LOCAL EDITOR, PROF. J. D. WALTERS
ALUMNI EDITOR, PROF. J. T. WILLARD

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C. L. F. Paull, Assistant in Botany .... ——
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THE INDUSTRIALIST.

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COMMENCEMENT AT THE KANSAS STATE AGRICULTURAL COLLEGE, 1902.

NOTWITHSTANDING the unusually damp weather and bottomless roads, the closing exercises of the college year were a complete success in every particular. From Friday evening, June 13, when the program of Commencement week began with a public recital of the Musical Department, till Thursday evening, June 19, when it closed with an alumni banquet in the Gymnasium, every public exercise was attended by throngs of interested visitors and friends, and the only regret expressed was that the chapel does not contain 6500 instead of 650 seats.

With the Manhattan *Nationalist*, which reported the Commencement in its last number, we can say: "Thus closed a very successful college year. The students on the whole have done earnest, efficient work. The discipline has been excellent. Scarcely a ripple has been caused during the year by the bad conduct of any student. A very generous and kindly spirit has characterized the school. The students speak in highest terms of the Faculty and the Faculty speak well of the students and of each other."

The limited columns of the INDUSTRIALIST do not permit the publication of lengthy reports of the many details of the program. If the drift of the masterly addresses by Doctor Beardshear and Mrs. Kedzie-Jones was to be given without using the blue pencil in every single paragraph, little space could be spared for some of the other items.

Musical Recital.

On Friday evening, June 13, the Musical Department gave a recital in the College chapel. The program was well rendered and reflects credit on the students as well as the instructors of this department, consisting of A. B. Brown, professor, and R. H. Brown and Miss Eleanor Harris, assistants. The program was as follows:

Overture—"Cubaoneon," *Beede,*	College Band
March—"Tanforan," *Hawkins,*	College Band
Piano Solo—"Valse Arabesque," *Lack,*	Florence Barger
Violin Solo—"Andante et Scherzo," *David,*	R. H. Brown
Piano Duet—"Invitation to the Dance," *Weber,*	Estella Fearon, Bessie Mudge
Piano and Organ—"Cavaleria Rusticana," *Mascagni,*	Eleanor Harris, R. H. Brown
Reading—"His Wedded Life," *Kipling.*	W. O. Clure
Selections—(a) "Crystal Schottische" (Banjo obl.), *Johnson,* (b) "Rag—Buck Dance," *Turpin,*	Mandolin Club
Selections—(a) March, *Hall;* (b) Waltz, *Brook,*	College Orchestra
Piano Solo—"Caprice Espagnol," *Moszkowski,*	Eleanor Harris
Piano Duet—"William Tell," *Gottschalk,*	Agnes Hopper, Anna Hostrup
Euphonium Solo—"Fantasia on 7th Air," *Hartmann,*	B. R. Jackson
Piano Solo—"Colombine," *Delahaye,*	Pearl Frost
Pianos, eight hands—"Zampa," *Herold,*	Eleanor Harris, Guy Souders, Florence Barger, R. H. Brown.

Baccalaureate Sermon.

The baccalaureate sermon was delivered Sunday afternoon in the College chapel at four o'clock by Rev. J. T. McFarland, of the First M. E. church, Topeka. After a musical selection Dr. John Hood opened the exercises by reading the 34th Psalm. A piano and organ duet was given by Miss Eleanor Harris and Mr. R. H. Brown. Reverend McFarland took for his text, II. Chron. 6:8, last clause: "Thou didst well in that it was in thine heart.'' His sermon was most impressive and calculated to inspire toward the highest purpose in life. He emphasized the following points: The man who never thinks great things and never undertakes great things never does great things. In one respect every man's life is a failure; that is, life will fall so far short in proportion to what he strives to accomplish that it will seem to him a failure. John Quincy Adams' life seemed in a high degree a success, but yet he asserted that his whole life had been a succession of disappointments, nothing having resulted in complete success. This should make us recognize the fact that life is not in the succeeding but in the endeavoring with patience and fortitude. All who have meant good work with the whole heart have done good work though they die before that work is accomplished. When the path in life divides, the highest elevations may only be obtained by always taking the upper fork of the road.

Society Lecture.

On Monday evening in the College chapel Prof. Geo. J. Hagerty gave an illustrated lecture, subject "Paris the Battleground of the Empire." It was given under the auspices of the four literary societies—Ionian, Alpha Beta, Hamilton, and Webster. The lecture was illustrated by a series of fine steropticon views, and was well attended.

Class Day.

Tuesday evening the seniors gave their class-day exercises at the Manhattan opera-house. The program consisted of music by Brown's orchestra and a play entitled "Sherlock Holmes." The play was well rendered throughout and very realistic. The character Sherlock Holmes, the detective, who had an unlimited amount of nerve and deliberation under trying circumstances, was very ably impersonated by Arthur H. Leidigh, secretary of the class. Ned Kimball made an excellent doctor and some of his patients recovered instantly. Miss Della Drollinger, as Alice Faulkner, and Miss Mamie Alexander, as Madge Larrabee, sustained their parts so as to obtain much favor with the audience. The other members of the cast were: P. H. Ross, Geo. M. Logan, E. E. Chase, John F. Ross, Glick Fockele, Glen R. Shepherd, Edmund R. Secrest, Geo. F. Bean, H. A. Avery, H. P. Richards, Otto M. McAninch, G. Poole, W. H. Spencer, Maude M. Coe, Bessie Bourne, and Martha A. Briggs.

Calisthenic Drill.

Wednesday evening a very pretty drill was given in front of the Main building by the classes in calisthenics, under the direction of Mrs. W. O. Clure.

Triennial Address.

The triennial address before the alumni association, given in the College chapel, on Wednesday evening, June 18, was one of the finest ever presented as a part of our annual Commencement exercises. The lecturer, Mrs. Nellie Kedzie-Jones, M.S., is a graduate of the Agricultural College (1876), an ex-member of the Faculty (1882-97), and is too well known among the friends of the College and the people of the State to need an introduction here. It is no overstatement to say that she is one of the strongest and most popular women of America. Mrs. Kedzie-Jones was presented to the audience by the vice-president of the alumni association, Mrs. Brock, of Manhattan. The following is an extract of her well-rendered address on "A Balanced Education." We only regret that a lack of space prohibits the INDUSTRIALIST from reporting the many beautiful illustrative stories and personal experiences which she interwove in her text:

The value of any life in this age is measured by the ability of that life to meet the demands made upon it. The training that

makes young people efficient we call education. The time has gone by when the questions "Who was your grandfather?" or "Whence came you?" were the principal ones. To-day the one important question is, "What are you good for?" "What can you do or give to make the lives of those about you richer or stronger or happier or better?" Unless the very best of which a life is capable comes into use for the world, unless every man and every woman makes the best of the talents God gave, then will that life be more or less a failure. Earnest, honest work can only be best work when the preparatory years are given to the best training possible.

Schools have been established to train children—young people —in order that they may become useful citizens. The State and the Nation spend vast sums of money annually that the coming man and woman may do more and better work than was given by the fathers and mothers. Private fortunes amassed by the genius God has given to some of his children are being poured out in this day for the better training of the boys and girls, until it seems as though no one should fail to do well all the work life brings to him, because every one may have an education if he will. With the men and women who control the expenditure of money rests largely the responsibility of giving to the youth of the land the training best suited to the demands the world will make upon the next generation. Time was, and that not long ago, when education was in the hands of the monks. The only school-house was the monastery. The teaching was predominantly religious. The monk's cowl shut in the light of learning. In time there came a revolt, and the world demanded that learning be unfettered; that the layman as well as the priest should have his turn. The ideal was culture for culture's sake. The only object of education was the comfort and happiness of the person himself who had bought that pleasure by the expenditure of time, money and hard study. There came a time when the utter selfishness of such a position became apparent, and to-day we demand an education useful for each and all. Such training as will make the possessor not only happy and a pleasure to himself, but will give him power to help those about him into better and happier living, to be the most useful member of society, and thus to conform to the demand the world makes on educated people.

While the education of a child begins with his earliest thinking

and his training begins before he is out of long clothes, sometimes he begins to train the fathers and mothers before he is out of the cradle; still we speak of education as that training schools give, and to-night for a few minutes let us look over the field and consider what the young people need and the world demands. Not long ago the dividing line between different types of education was as pronounced as was the line in politics. In war times a man must be either a Federal or a Confederate—there could be no middle ground—and the struggle for supremacy was long and bitter. Many of you remember the heartaches and the sorrow, because each side believed its own cause was right. To-day, when the two sides are blended into one nation, harmony and happiness are our heritage and both North and South grow stronger every day for the help given each through the differences found in the other.

The war in educational matters was not a war of gun and sword, yet the heartache in some cases was not easy to bear. When the world conceded education to mean only the reading of Greek and Latin and the study of mathematics, the man who dared to say there was true training for the mind in studying the trees or the rocks, the insects or the birds, was derided and scorned, and as the people, that greatest of all powers in our land, slowly came to the point where the practical side was demanded, there was a bitter struggle to hold the schools to the old lines. If the inside history of many a college in this land could be known there might be a long story of actual warfare over the two types of education. But a better day is with us, and now the world is trying to balance up the work of all schools by taking the best of both types and putting it before the pupils as a whole until they are men and women, then planning for each student according to the talents given him, seeing carefully that none dig in the ground and hide his Lord's gift.

You Western men talk much of a balanced ration for your cattle and you plan so much of carbohydrates, so much of proteids, a perfect food for your stock, but you watch a great herd carefully and when one steer does not thrive on the general balanced ration you take him out and change his food, making a special ration for him; but if you have a score of such you never for a moment depart from your belief in the balanced ration for the majority. The great laws of nature do not vary in applica-

tion. Because one boy or girl is a genius in acquiring languages, that is no reason why every child must be dragged through years of language study beyond that necessary to know his own mother tongue and use it with power and effect. Because one man is interested in plant life to the extent that he can give to us all new facts about plants every year is no reason why every child should have to study botany beyond the point where he can recognize his friends and his foes in the plant world, and be ready to find the facts he wants as occasion requires.

When the time comes that all schools shall follow the example set by those of the most liberal cast, and every institution of learning will carefully select out of the two types of study—classical and scientific—that which will do most toward rounding out the growth of mind and making the child the most level-headed, broad-minded man possible, we shall hear less sneers about dead languages and wasted years. There is no doubt but that the culture and grace possessed by many of our public speakers—and say what you will, they have much to do with the moulding of public sentiment and the consequent swaying of the people—the culture and grace that makes them attractive speakers, the power to put ideas strongly before other people, is largely due to the training given them in the languages from which our own English words are derived. It means much to be able to discriminate between shades of meaning, and as a people we are sensitive to these touches and respond very readily to the sentiment aroused. Occasionally we find an American who possesses in a rare degree that power with words without that early training. Lincoln was a genius in that direction, as well as in many another.

But we are not all Lincolns, and the marvelous power over words shown in his Gettysburg address, in the various messages that came from his pen, can only be attained by the rank and file of American citizens by long and patient study. It is a curious fact that the people who have had least opportunity to know the origin and the meaning of words are most fond of huge mouthfulls of syllables, like the negro preacher or the beginner in Fourth of July oratory. Those who have most loved and known and studied words make most out of those of simple form. We never expect our young people to become athletes without training. Can we expect them to be able to impart their ideas without good training in the use and meaning of language?

The great mass of our people to-day recognize in the scientific side of school training development of soul along with the growth of mind needed. The sermons in stones, the books in running brooks must appeal to the better part of humanity and the true scientist must, because of his work with nature, live more closely to nature's God.

We hear often of specialization, and there is an argument in favor of early specialization, provided one is really working to make specialists instead of men, but the ablest specialists have been and are those who were first well rounded-out people with heart and head and hand so balanced that their special work had always the touch of human love for humanity, and thus the glory of soul work was added to knowledge of the secrets of nature.

The best doctor is the man who is educated in many lines, who has had a thorough training under earnest Christian men and women, until he is a rounded-out man who has thinking power before he touches the special study of medicine. The minister who wields most influence for good is the man first, and the better his general knowledge the more effective will be his special work. One of the strong teachers in scientific lines, whose work belongs to the generation just past, began his work in agricultural chemistry when he was forty years old. The work of forty years, for he is still teaching, has turned largely to definite results for the good of humanity. A State senator said of him: "His chemistry has put millions of dollars into the pockets of the farmers of our State." And that is only one line in which he has turned his work. Everything he touched was questioned as to how it would better the human race; every problem was solved with an idea of making life easier or happier for some one. One reason why he has worked so generously for the definite good of mankind is because he had a man's view of the great world before he became absorbed in his special line of work. The pursuit of science for science's sake is akin to the feeling of a great mathematician that prompted him to say, on the discovery of a new solution to a problem: "Thank God, nobody can ever use that!" To-day we know that only as knowledge is used can it become a power for good.

Teaching the young people a judicious amount of the classics to develop the power of imparting ideas, teaching such an amount of science that they may develop ideas to impart, will give the kind

of brain training we desire in the schools. Brain training is well, but that is only one-third of this balanced education we hope to see in every school. When we consider that we have two channels of expression—one being the tongue, the other the hand—we at once believe the statement that for generations we have undertrained the hand and overtrained the tongue.

While language and singing seem to be the only avenues of expression by the tongue, the hand has a number of ways by which it gives ideas to the people—through painting and sculpture and instrumental music, through landscape gardening and architecture, to say nothing of the mechanic arts. We say we educate the child that the man may have ideas, but those ideas are but a selfish possession unless worked out for the benefit of the world. Ability to work out the ideas that can only be expressed by objects made by the hand gives to the world the men and women who have done most to beautify our lives. They have helped us into higher, happier thought because we saw the evidences of the power of well-guided humanity. The wonderful White City of a decade ago means little to-day to those who only heard it described. The greatest meaning comes to those who wandered through the streets, over the bridges, gazed upon the fountains and the well-arranged grounds, looked up to the buildings or sat in the Court of Honor. A new meaning comes when one mentions the moonlight on the lagoons, with the song of the gondolier or the chime of the bells ringing out the twilight hour. All this was only possible because trained hands had been able to work out the ideas evolved by trained brains in such shape as to reveal those ideas to every beholder.

Buildings are not the only means of communicating ideas by handicraft. The piano sends out wondrous music only as the trained hand touches the keys. The canvas delights the eye and cultivates the artistic sense only after it has been touched by the brush in skilled fingers. The block of marble yields its imprisoned Venus only as the chisel is guided by a quickened brain working through hands that are so deft and so ready they can almost create a soul in the beautiful figure of stone. Do you say I am speaking now of genius, not of training? Then I say to you the genius of an artist burns in the soul of many a man who has never had the opportunity to train the hand, and who thus lacks the power to show the world the ideas that flame within him.

The genius of a blind Tom is perhaps more than the genius of a Paderewski. The one was untutored and untrained; the other had the best training the world could give his fingers. I leave you to judge of the power the two men have exerted on the musical world.

All manual training, properly speaking, is training the hand to work out the ideas of the brain. A man may be a good workman in one direction and still lack real correlation of brain power and hand skill. It is only when the two work together that a man is well educated. I believe the day will come when one who can only use his brains will be considered but half educated, just as much as we to-day consider the man who can only use his hands as only half trained. It is as poor economy to use only half one's powers as to expend power where it accomplishes no end.

The movement of industrial education is only a new inspiration of the best head and heart wisdom of the whole world for the emancipation of workmen from the old-time ignorance and inefficient toil that marked the difference between drudgery and happiness. It is well for us to remember that the term industrial *education* should have the accent on the second word. It is industrial *education*, and education means to lead out and to use all we have. Industrial may mean any kind of drudgery, but to have an industrial education means that the hand must be guided by a trained brain, and that must have behind it the quickened and understanding heart. Ruskin says: "There is no healthy thought without labor, there can be no happy labor without thought—the two must go together." The grand old man of England recognized this, for when he wished to think his strongest he went out and chopped trees.

The men and women who have given something the world wanted to remember have been men and women who were no half-way people; they were whole workers—workers with heart and head and hands. When a woman who has perhaps given this country the strongest novel of the past century washed her dishes and moulded her bread between pages she brought a practical realization of the science of living which meant more than brain work, more than hand work. It meant both together, and therefore gave a strong personality that showed to the reader of "Uncle Tom's Cabin" how a womanly heart could stimulate a strong brain and conceive the great things of life.

We say, in order to understand the thoughts of others we must learn to think. I say, in order to understand the work of others we must learn to work. Doubtless few of us will think really great thoughts, but we all hope to appreciate them, so we can expect to understand great work better if our own hands are deft and ready to do some of the many kinds of work the world demands. There is little danger but that the American boy, unless an idiot or a criminal, will some time in his life find hard work for either body or mind. It seems a part of the birthright given in this land of labor and plenty. Well for him if his work is well-balanced, and have that of both brain and hand. The girl, too, born to American ideas, will work, if she have the average amount of brains. The pertinent question is, how to train these young people that work may mean more result and less wear and tear.

Domestic economy, giving, as it does, power to judge and buy, to construct and wear clothing, helps a woman to dress herself and her family with the least expenditure of time, money and labor; giving, as it does, knowledge of household fabrics and furnishings, gives ability to make the house attractive, and to so care for it that the greatest amount of happiness to the square inch is yielded every day. Domestic economy gives knowledge of the production, the preparation, the serving and the value to the body of foods, enabling her to give her family good physical and mental power, while it also gives her training in the care of herself in health and of her loved ones in time of illness. She is enabled to easily manage all the various lines of her business; and who of the whole world carries so many lines as the housewife? This ability to manage all the departments of her home comes to her not alone through her knowledge of theories, but through application of known principles by her own hands that have been trained in all the lines of domestic demands. While she knows botany for her fabrics and foods, entomology for her insect friends and foes, foes usually predominating in the home, physics, which is only sanctified common sense about the common things of life, chemistry for the combinations of elements, bacteriology for knowledge of her germ friends and foes, and sociology for the good citizenship she must practice, still, all her life long, the deftness of hand she has learned in the sewing room, at cooking or dining table, at chemistry desk or with the microscope, in hospital or in home, will enable her to work out her

ideas, and only because of that deftness will she be able to carry forward the strong work she delights to manage.

The change in education from the three "r's" to the three "h's," from "readin', ritin', rithmetic" to training of heart, head and hand, has been one great stride of progress the century just past has made. We are realizing in a full sense that a heart to promote, a brain to plan and a hand to practice are the essentials for full living to either man or woman.

The training of heart comes to the child we are preparing for life's battleground from his earliest years, but it is a training like that given for bringing sweet music from the stringed harp—the training must be continuous. The practice must never be neglected. Much of this training comes through the influence of the church, for no matter what name it carries, Catholic or Protestant, it has a saving hold on the deepest inner being of its adherents. No grip is so hard to shake off as that of early religious convictions. "The still small voice coming down from the time when shepherds watched their flocks by night" in old Judea echoes yet in cathedral, church, and open-air meeting. It gently if mysteriously imparts to human life the distinctive quality which is the best exponent of our civilization of to-day.

"Upon the nature of a child it makes an impression that forever afterward exhales a fragrance and blends his characteristics into a power for the saving of the nations." The cultivation of heart means the training that gives power to be a real helper in all good work of the world. It means that love for God and love for man is cultivated in each life and that every day's work exemplifies the human helpfulness such love gives. It means that to be a clean, strong, earnest, Christian man is the aim of each well-educated American boy, and it gives the power to carry the womanly influence that may move the world to every girl who has been given her due. Above all, it means honesty. Not only the reputation that is above stealing a neighbor's purse or his chickens, but the honesty that will protect the neighbor's good name and that will earnestly strive to uphold the standards of right living before the neighbor's boy.

Many feel that a school is not responsible for character building; that those teaching older pupils particularly must teach their specialties only and let all other work alone; but woe to the instructor who fails to hold up lofty ideals in the class room every

day. The teacher who fails to give an example of earnest, faithful work, who neglects the opportunity given him to help the student, not only to find the facts he seeks but also to grow into better thought about standards of living and into stronger Christian character, has forgotten the best of his work, and it were better for him if a millstone were hanged about his neck and he were cast into the midst of the sea.

The pupil in the public schools asks and receives the best the school board can provide, if they be honest men such as Kansas school districts always elect. The students ask and receive the best that the colleges can provide. The great questions to-day concerning education for students of all ages depend upon public sentiment, and that can only be crystallized into actual demands upon the schools by the united work of parents and teachers. The graduates of a school make, in the course of years, the greatest body of interested patrons the school can have. With them rests in large measure the duty of first seeing that their Alma Mater does every year for the students of that school just the kind of work that they would wish done for their own children. Sharp criticism will never accomplish the purpose; only earnest, helpful coöperation with the administration, only the best of thought and the most judicious application of that thought can really help this College or any other to do its best work every year. It is never best work to be satisfied with past work or to be happy to stand still. There must be steady growth. Good foundations alone, however well laid, will not make a College.

You know that when the evidence is in, the judge solemnly arises and charges the jury; when the candidate for ordination to the gospel ministry has successfully passed examination, then comes the sacred charge. You, in receiving graduation from these College halls, have entered into the sacred alumnal office. You have a solemn duty to perform. I therefore charge you to guard jealously the good name of our Alma Mater, to defend her against attacks of partisians who would use her for personal ends, to keep her interests before the public, and see to it that the generous support of the past shall grow more generous in the future, to keep her close to the common people, "for God loves the common people or he would not have made so many of them," to train your children to love her name, and when they are old enough to send them here with your neighbors' children. Fear-

less but friendly must be your attitude and all your thought must be only for the advancement of standards.

Balanced education should be our aim. It is well that we send out agriculturalists and botanists and chemists and domestic scientists, but it is imperative that they be first men and women. Our mother must send out into the world such children that we shall always be happy to claim them as our younger brothers and sisters. The world to-day demands so much more of its workers than it did even in the last decade, that we are under obligations to give more and better training than we had.

The College family is all of one kin, and as we love our home, so we must work for it. The best we can give is none too much for our beloved mother, for she makes home for us all. We Americans love home. The peace and perpetuity of every home depends in the long run upon a sound system of education. Therefore, let us each and all make it our mission to provide for every son and daughter on these prairies a symmetrically balanced education.

The Annual Address

to the graduates was delivered by Pres. W. M. Beardshear, LL. D., of the Iowa State Agricultural College. Doctor Beardshear is the president of the National Educational Association, a well known educator and a forceful speaker. His address, of which the following is a synopsis, was a masterly effort and was listened to with growing interest:

"The Geography of Character."

Some one has said: "Providence has divided mankind into three classes—those who are sure of their breakfasts throughout life, and this is the chief result of civilization; those who are sure of a moderate number of breakfasts ahead, certain or uncertain, and they are the wage earners to a great and increasing degree; and those who do not know where to-morrow morning's breakfast is coming from." You young friends have probably belonged to this first class and likely always will, yet life is not a question of one's own breakfasts alone. Square meals are conditions of square living. In German story lore it is stated that a certain fabulous man had only to wish for roast chicken and the chicken flew into his mouth finely roasted. There are many such theorists and their relatives to be sobered to the art and the science of preparing their own breakfasts. The rule is, a man's own breakfast

first, that he may make the breakfasts of others securer. Bad stomachs make poor citizens.

Man is a reckless geographer with a big world and lots of room. He makes his home in the environ of some Mt. Pelee, where previously the earth has belched forth destruction. People, terror stricken, now flee from the Isle of Martinique, but back in the beginning of the previous century these death-dealing experiences of volcanic eruption were most terrifying. Even now the inhabitants of the Barbadoes, after the black night of ashes put their scientists to work to analyze the dust with a view to its fertility of soil, and look up history that in 1813 a similar fall of volcanic ashes greatly enriched the crops of the season. With Vesuvius still smoking man erects a Naples of peaceful homes, merry-makers and industry seekers. "Lisbon rises beautiful and imposing where a convulsion of nature once brought unutterable fright and desolation." The citizens of Galveston, Tex., are negotiating in New York City bonds for the restoration of their beautiful city on the same spot where but a brief time since destruction and death swept over the streets and lands as implacable as the unbridled sea. Along the banks of dangerous rivers, like that of the Hoang-Ho, men build their homes unmindful of the destructive waters which without warning may sweep them to a watery grave, as in the past, history thrillingly evidences.

Man pitches his tent in miasmatic climes and coops himself in untenable tenement houses and in health-forbidden abodes of death-bearing germs, in spite of the voices of science, with the hope of larger years and freer dollars. A clean spot of earth is a fundamental condition of a wholesome soul. It is not the size of the patch or the building, but the cleanliness from matter to spirit, culminating in the beautiful that conditions a wholesome geography.

The geography of the North American continent in its influence on character was never so evident and beneficent as now. The remarkable variation of soil, clime, vegetable and animal life possible with such a variable scope of earth is entering deeply into the consciousness of all countries. A prominent American newspaper writer has just crossed what he calls the great Atlantic ferry to study what Germans call "The great American peril," and the English "The Yankee invasion in Europe." He is hunt-

ing for the causes of the two million dollars a day balance of trade with Europe in favor of America. His tour will take him to all the industrial centers and greatest markets of Europe. His trip takes him to Russia, the granary of Europe. He finds the American to the front, from majestic bridges and railway engines to eye glasses and doll babies. Varied electrical appliances and the best inventions of American machinery are commanding the trade of the old world and awaking it to new life. From canned goods to rubbers and matches the successful American competition is pronounced. The substitute for Horace Greeley's "Young man, go west," is now "Young man, go abroad." All this means to me not an invitation to rush abroad nor to lose our heads over Germany, wooing us by the visit of her prince, and England, by the pleasing flatteries of her dignitaries and diplomats, but it means a call for deeper, wider, higher understanding of the geography of home environment. It means a demand upon the educated American youth of the day to know the meaning of their own states, country, government, commerce and civilization.

There is a great good coming from the counsels of others, yet a vast amount of counsel is limited and colored by too much of personal experiences of the counselor. It takes a generous heart, a magnanimous soul, a masterful spirit to give advice worth anything. Our well wishes are aptly illustrated in the little poem of three wishes.

An infant in its cradle slept,
And in its sleep it smiled—
And one by one three women knelt
To kiss the fair-haired child;
And each thought of the days to be
And breathed a prayer half silently.

One poured her love on many lives,
But knew love's toil and care;
Its burdens oft had been to her
A heavy weight to bear.
She stooped and murmured lovingly,
"Not hardened hands, dear child, for thee."

One had not known the burdened hands,
But knew the empty heart;
At life's rich banquet she had sat,
An unfed guest, apart.
"Oh, not," she whispered tenderly,
"An empty heart, dear child, for thee."

And one was old; she had known care,
She had known lonliness;
She knew God leads us by no path
His presence cannot bless.
She smiled and murmured trustfully,
"God's will, God's will, dear child, for thee."

But even this wise and good old friend of the third wish likely put a great many things in God's will that did not belong there. God's will delights in health and entireties, not in sicknesses and imperfections. God's presence on earth expressed his will in giving new eyes to the blind, perfect nerves to the palsied, a whole leg to the lame, a sound mind to the maniac, and even life to the dead Lazarus. Perfection is the will of God. "Be ye perfect as your Father in heaven." Who knows God's will except as it is written in his own body, his own soul, his own age and the ages of the past. The primal virtue is appreciation. Appreciation is simply placing a just value on the body and its life, the mind and its culture, money and its mission, man and his destiny, life and its purpose.

He must appreciate his own partialities and the piece-meal attainments of others to be successful. One of the experiences of an early thoughtful life is the rapid change of so-called bosom friends. One starts out expecting completeness in every one and acts accordingly with his confidences and counsels. He soon wakes up, if he is wise, to find many of the best of friends partialities. This is a discovery of a universal law in the present stage of civilization, that an individual is known by a few qualities rather than by a complete embodiment of the cardinal virtues. There is a virtue and a grace in appreciating this law and these one-sidednesses.

We find this true in books. We are constantly outgrowing books and authors. Every age must have its own literature. Scarce any book will live one hundred years. Where we have one Shakespeare, one Pilgrim's Progress and one Plato we have ten thousand volumes buried in the ashes of forgetfulness. It is a sweet enthusment to be under the first spell of an author, and a bitterness in equal degrees when a favorite wanes.

The mother swine in the pines of the South, dependent upon their own exertion for life, usually start out with twelve or fourteen young and succeed in raising one or two to life and maturity. So the average person starts out with many virtues, but usually

ends with the perfection of one or two or three. The appreciative observer learns to cultivate each personage for the perfection of these monosyllabic excellencies. There is even an old Saxon vigor of one-wordedness of pith and point in a virtue homed largely and alone in one soul. Even a hobbyist has an attractive side in analysis, if you can courteously withdraw from him after reaping the fruitage of his pet idea. One of the most powerful elements in the character of General Grant as a military leader was his remarkable application of his personal acquaintance of early West Point school life in his combatting and outgeneraling the generals of the Confederate army. He had known the most of them as cadets in the military academy and invariably made his plans of battle against them as based upon the recollection of their characteristics at West Point. He appreciated their partialities of attainments.

To be successful one must come to appreciate his own illusions. There is a life of illusions. From the earliest history things have not been what they seem. The leading philosophers of the early ages attributed a soul to the earth and universe by reason of their ceaseless changes and tireless movements. The heavens were supposed to be basins or bowls with the concave side to the earth so as to catch its evaporations, the burnings of which made the flames of light, the sun and stars. The sun was no larger than twelve inches in diameter, its actual appearance. The earth was at one time supposed to be flat. History is yet fresh with the life of the indefatigable geoprapher going from court to court of wise Europe to gain credence to his theory of the extension of the eastern shores of Asia and how the apparently silly delusions of his brain discovered a new world. It requires but three of our fingers to number the centuries since the establishment of the Copernican theory of the heavens, now known to every school boy, and but a few months ago there died in Richmond, Va., the Rev. Mr. Jasper, the celebrated colored orator who had delivered to appreciative audiences over four hundred times his lecture on "The Sun do Move."

Our individual life is filled with illusions. The babe stretches his hand in eager glee for the blazing fire. The child must begin with the philosophy of Thales and through ancient and modern philosophies tutor his senses to the proper relations of life. The boy pictures in vivid colors how things will be when he is a man.

The man, like in the early fifties of this century, the tracers of the plains over the then great American desert, presses earnestly to the gold fields of some great West in business, church or state. The aged man having applied his heart "to know wisdom and to see the business that is done on the earth" looks about him in amazement to observe whether he has missed his bearings and whether this is the gold whose lustre shown so far and whose possession promised such supreme contentment.

There are illusions in our conceptions of life. There are rife visions of some natural bridge whereon we will notch our names above every other. There are precipitous heights whereon our flag of excelsior, self inscribed, shall be planted. There are visions of some burning ship whereon, unlike Casabianca, we will say but once, "My father, must I stay?" and have sense enough to get out of the way of the flames and live in undying fame. Then there is the idea of a great mission in life; of a work known only to the angels and one's self whose complete fruition will one day astonish an admiring world. Every youth's brain is a Washington's patent office that contains almost innumerable models of excellencies mostly great in promise, whose principal worth rests in seeing light and experience enough to die outright. The youth is not to be blamed for these visions. To be good and great, he must needs have them. Illusions are the food of an active life. Better yet, they are the scaffolding that leaves an edifice of superior architecture, a thing of beauty and joy, real and sublime, amid air.

To be successful one must appreciate his own ambitions. It is fashionable with a great many nowadays to decry ambition. They say he is ambitious, as though it were an awful sin to long to be somebody or do some things. One of the magazines for June has an article on the Dangers of Ideals. Just last week, late at night, I came into a reception room with the delight of a boy over a great sack of fish numbering seventy-one, the catch of the day. As I went out of the room I heard an old millionaire whisper across the table to his companions with marked disparagement: "He is an enthusiast." I had been thinking over these things for a number of days and that was the puncture that took all the soreness out of my feelings. The sentence went over and over in my mind after retiring and I came to the conclusion and the exclamation, "Thank God, I am an enthusiast."

You never found anybody of any walk of life doing much in a sleepy, indifferent, lucky-go-hazard spirit. "The kingdon of heaven suffereth violence, and the voilent take it by force." But with these ambitions it must be, "Watch ye, and keep them until ye weigh them before the chief in the chambers of the house of the Lord." This failure of proper appreciation of ambitions leads to a confusion of that that is selfish and unholy with laudable aspiration. Laudable aspiration leads men to pant in making the most of themselves. Unholy ambitions originated with the Roman who went around the streets bowing with sycophantcy for favors to lift him to the head of the nation. As illustrative of unseasoned ambition, the biography of our country presents striking examples of men over-much anxious for the presidency of the United States. Mr. Henry Clay, whose eloquence was intangible to delineation, marred his record by an undue seeking of the national presidency. Mr. John C. Calhoun, whom recent years freer from early prejudices are bringing out as one of the greatest statesmen and finest orators that ever shared the nation's counsels, did not help his greatness by warm, presidential aspirations. Mr. John Randolph, the shrewdest, rashest and brightest of brilliant statesmen in the first half of this century, would have had a much more savory reputation and given his gifted character more indelibly to the lives of his countrymen had he been freer of petty jealousies and bickerings begotten by his yearnings for the White House. General Lewis Cass, of great ability, marked prudence and sound judgment, gained nothing of worthy notoriety by anxiety for the supreme magistry of the nation. General Winfield Scott, of undaunted patriotism, a hero of two wars, of extraordinary executive and military ability, would rest less upon the charity of the intelligent student of history if dispossessed of his longing glances at our nation's chair. Salmon P. Chase, who was one of the founders of the great political party, the slave's friend and the nation's distinguished defender through the most crucial tests of our history, became so eager for the presidency of the United States that it was in the minds of the people the greatest obstacle in the way of his securing it. Horace Greeley, the poor man's friend, the nation's benefactor, and one of the greatest and most independent of journalists, allowed his life to be shortened by his reach for the national presidency, apart from which he would stand a greater man in the records of our

country's story. These were great men. Though like Icarus of old, they kept from the damps of earth, they exposed the wax of their winged ambition too near the sun and were overwhelmed in a sea of discontent.

Aspiring to be gods, if angels fell,
Aspiring to be angels men rebel.

When in college, a new book called "The Every Day Philosophy," now out of print, came to the library shelves. It was a book of practical essays. In it was a chapter telling about the illusions of a young man and the soberness that came to him in his mature life. There was a certain vein of pessimism and disparagement in it because it kept out the merits of illusions and ambitions. I read it with a great deal of disappointment and scepticism. Years afterward it was my lot, with a leisure hour, to stand in the early morning upon the thoroughfare of one of our largest cities. The curtains of life's great drama were drawing for the acts of another day and all were assuming their respective roles of character. The manufacturer was hurried along with his fine equipage to the busy floors of his distant factory. The merchant, combining health with pleasure, was bettering his blood by a morning walk to his restless desk and thronged counters. The man of leisure was conspicuous by his absence and probably still roaming in the Elysian fields of some happy dreamland. Clerks and factory hands elbowed one another on their way to work. Vehicles of varied missions thronged the street while the peanut vender guided with care his fragile cart and its delicate load through the rushing throng to his favorite stand. The rag picker dodged in and out with a sack, rapidly filling by reason of the last night's profligacy of paper and rags. The tramp, stirred from his stolen bed in a neighboring box or doorway, was seeking the quieter scenes of a remoter street. The beggar, with his "Please sir, can't you help a poor fellow that's in trouble?" was securing his last pittance for another day. She whose ways take hold on the grave, sinned against as well as sinning, hastened to her dearly bought meal. The newsboy startled you with his vigorous cry and stirred your sympathy with his indomitable pluck. Travelers were hurrying to the early morning trains with a speed that lent thrill to this already enlivened scene, while manly policemen preserved the mass from chaos. Hungry dogs earned their precarious meals from the street, and irrepressible sparrows

fought over its refuse. Pigeons pathed the street with their shadows in their morning flights—the purest of all this busy throng. The deafening escape of steam from engines, fretful of their long journeys, and the whistling and screeching of boats added climax unto this phraseology of life. Money, fame, bread; happiness, desire, appetite; father, mother, child, brother, sister, husband, wife, friend and lover; self, neighbor and God are mingled here with a million motives whose moral philosophy the mind of the Infinite alone can determine. This is a microcosm—the world's miniature. If "all the world's a stage" and all the men and women merely players, "here is the enactment of its wondrous drama." Viewing the acts of this enchanting play, I fell into a reverie and awoke with the words, "Seekest thou great things for thyself? Seek them not," repeating themselves over and over.

This led to a settled conviction of the primal motives and ambitions of life and the verifying of the importance of taking the brotherhood of man into one's love and ideal, honor and work. After another marked interval of years I am repeating to-day to you young friends these philosophies of a practical life with the tempering, experiencing, suffering and growth of all the years.

To be fully successful a man should appreciate his own weaknesses. Happy is he that know his weaknesses, for then he is strong. The safety of our navigable rivers and seas rest vitally in buoys and light-houses signalling danger points. Every reputable port has its own pilot, who at the outermost station takes charge of incoming vessels because he knows the weaknesses of the neighboring waters. A man should know his own conceits, for they are often the sides of approach for a competitor or an enemy. It is a helpful study for a man to see whether the strings in the instrument of his own conceit are being moved skillfully or bunglingly by others. It gives the owner vantage in contest and commerce. Honesty and righteousness flourish in flatteries as well as in the dealings of the market. Each man should understand his own flatteries, for it is the subtlest mastery in a wholesome self-control. We admire some people because they are so artful in the diplomacy of flatteries. The man that says he has no flatteries in that very expression exposes a wide-open gulf of approach in flattering him in that he cannot be flattered. Virtue and grace nourish vigorously in the sincere appreciation of these weaknesses in human nature. The views of

a landscape before and after a meal often vary as greatly as the bog and its miasma and the upland with its pleasing contour and singing larks. After all, man is his own best arbiter. He should know his own physical weaknesses and his mental limitations and constantly build himself up in strength and content against them both. Fortunate is the man big enough to acknowledge to himself his own shortcomings, magnanimous enough to not scourge himself for them, and wise enough in the observance of buoys and light-houses so that he can watch, keep his flatteries and weigh them before the chief in the chambers of the house of the Lord.

Your gifts of gold are your opportunities. Opportunity means being at the harbor when there is a mission to fulfill. "Know your opportunity" is one of the earliest injunctions of philosophers to the youth. Here is demand for appreciation of failures. No one ever made master work with first strokes. The law is through failure to success. The failures of others can be made way marks to a better land. Theocritus had the philosophy well in hand when he said:

> A ship-wrecked sailor, buried on this coast,
> Bids you set sail;
> Full many a gallant ship, when we were lost,
> Weathered the gale.

Still the question remains, What is success? In the construction of the high bridge at Boone, Iowa, as in the structure of any bridge, the first chief concern was the dead weight of the bridge. The capacity of the structure to hold up the five thousand and more tons of steel against the laws of gravitation and the elements without any load upon it, small or great, is called the dead weight. You may remember the disaster some months ago of the iron-work of the first structure of the Coliseum in Chicago because its dead weight was not sufficient to hold up its own tonnage. In success there must be the proper dead weight of the human body. He who wins fortune, fame or power at the cost of his physical energies has marred his success grievously. An exception to this occurs in which through the call of country or humanity more lives are at stake than the worth of a human body. It is honorable and successful to give one's health and life to the larger welfare of land and brotherhood. But in the normal pursuits of life we count it a mark of strength and credit that the average age of

man is prolonging perceptibly. If as a whole this is a credit to civilization it is especially meritorious in the individual who like Gladstone, Justin Morrill, or William Cullen Bryant of America, keeps a normal dead weight of the vital energies beyond the usually allotted period of man. Much of the happiness and usefulness in life depends upon a good digestion. A vast deal rests upon the awakened senses that communicate so delicately and divinely through the media of flesh and blood. If nothing is in the mind which has not been first in the senses, a normal condition of the organs of sense is a stupendous question and problem in one. Just this week a man said to me: "My uncle is visiting all the health resorts in America and Europe to get back the vitality he expended in making his money. He has more money than he can ever use and no vitality left with which to enjoy it." This bears its own comment. Solomon had it right: "Better is little with the fear of the Lord than great treasure and trouble therewith." Statistics show that there are five men for every four women in the lunatic asylumns of the world. Vital statistics further show that the cities and strenuous pursuits of man and civilization are fed up and sustained by inflows from the country and the pioneer realms of society where hardihood of body and integrity of character are prevalent.

Domestication of man and animal tends to degeneration. Education must redeem this somewhat lost art of how to mould a physical man, amid fevers and miasmas of shut-in pursuits and livlihoods. Complete success must embrace such an attainment.

What high form of life can we not find in Emerson? In describing the largest person he has well enpictured the successful man on this soul side of his attainment:

> He must be musical,
> Tremulous, impressional,
> Alive to gentle influence
> Of landscape and of sky,
> And tender to the spirit touch
> Of man's or maiden's eye.
> But to his native centre fast,
> Shall into future fuse the past
> And the world's flowing fates
> In his own mould recast.

"Musical" is apt, for the most successful personage abides in harmonies, melodies and rhapsodies if a varied emotion, thought

and will. "Alive to gentle influence," he feels the goings of the morning, the hush of the evening, the birthfulness of the intuitional stars, the moods of the sky and the inspired scriptures of the field. "Tender to the spirit touch," he knows the chaos in the creation's dawn of childhood, controls the destiny that determines his seasons and enseeds his earth, interprets history and biography by intuition of a perfected life, masters his business by right motive and fair dealing, and fathoms the loves of the human heart by the catholicity of a citizenship of the universe. "To his native centre fast," he interprets God to man and links man to God through the primacies and supremacies of a well-formed soul, and fuses the world's flowing fates in the recast of an all-round modern-day life. In "Aurora Leigh," Mrs. Browning profoundly portrays the highest offices of beauty and art in an age or a life. The poem reaches a holy consummation when she says:

> And verily many thinkers of the age,
> Aye, many Christian teachers, half in heaven,
> Are wrong in just my sense who understood
> Our natural world too insulary, as if
> No spiritual counterpart completed it;
> Consummating its meaning, rounding all
> To justice and perfection, line by line,
> Form by form, nothing single nor alone,
> The great below clenched by the great above.

This halfness in heaven, this insularity is a bias in many otherwise good and successful lives that tend to weakness, impracticability and inefficiency of life. There is an earthfulness that is wholesome. There is an every-dayness that is holy. There is a road-readiness that is devotional. There is a soldier-sainthood that renders the book and the gun alike sanctified. The pen and the plow, the pencil and the hammer, the crayon and the book consummate the meaning of the truest life,

> Rounding all
> To justice and perfection,

in the virile every-day-not-too-good-for-nature's-daily-food life which like that of the Man of Men is the light of the world to make sure of

> The great below clenched by the great above.

Conferring of Degrees.

After a beautiful selection by the orchestra, Pres. E. R. Nichols rose and addressed the graduating class. In a few well-chosen remarks he drew their attention to the fact that the State of Kansas and the Nation, who jointly had founded and maintained the Agricultural College, had completed their task and now expected that every one of the candidates receiving a diploma would do his duty. The members of the class stepped forward as the President called their names—a circle of handsome young men and women—while the audience, the Board and the Faculty rose from their seats to watch the inspiring scene.

Class of 1902, and Theses Subjects.

Mamie Alexander, *Printing: Its Invention, Progress, and Influence on Education.*

Edgar McCall Amos, *Making a Newspaper (A Psychological View).*

Henry Albert Avery, *Studies for a New Horticultural Building.*

Etta Marie Barnard, *"As a Man Eateth So is He."*

Mary Olive Barr, *Flowers in American Poetry.*

George Ford Bean, *Some Hysteresis Tests on Iron.*

Charles Dallas Blachly, *The Effects of Sunlight on Bacteria.*

Bessie Sarah Bourne, *Home Education.*

Martha Amelia Briggs, *Relation of Bacteria to the Home.*

Emma M. Cain, *Look Around You—Nature as an Educator.*

Floyd Adelbert Champlin, *The Spread of Infectious Diseases by the Transportation of Stock, and their Prevention.*

Elijah Ellis Chase, *My Farm as it Is To Be.*

Charles Howard Clark, *Building up a Herd for the Economical Production of Butter-fat, on a Foundation of Native Kansas Cows.*

Maud Mildred Coe, *Relation of Bacteria to Disease.*

Murray Stanley Cole, *Tests on the Efficiency of the Power Plant at the Kansas State Agricultural College.*

Robert Curtise Cole, *Soil Moisture and its Conservation.*

Lotta Irene Crawford, *The Home; its Development and Care.*

Sarah Emily Davies, *A Description of the Sounds and Silence of the Poetry of Keats.*

Della Drollinger, *Influence of Expositions.*

Charles Eastman, *The Evolution of Infantry and Cavalry Tactics.*

Leslie Arthur Fitz, *The Evolution of the* Genus Triticum *as an Economic Cereal.*

Glick Fockele, *Tests on the Efficiency of the Power Plant at the Kansas State Agricultural College.*

Clark A. Gingery, *A Year's Work in the College Nursery.*

Willian Lee Harvey, *The Coal Measures and Coal Veins of Kansas.*

William Rutherford Hildreth, *Cow-peas for Kansas.*

Christine Delphine Hofer, *Cultivation of Skill.*

Henrietta Mattie Hofer, *Music and its Influence.*

Edward Wilfred House, *Some Comparisons of Lepidopterous Wings.*
Letta Birdilla Keen, *A Plea for Music.*
Edgar Willis Kimball, *William Morris and His Work.*
Arthur Henry Leidigh, *The Breeding of Agricultural Plants.*
George Logan, *The Relation of Nitrification to Bacteria.*
Otto Meade McAninch, *Quarantine and Its Relation to the Spread of Infectious Disease.*
Amelia Augusta Maelzer, *Home Grounds.*
Myrtle Mather, *A Practical Application of Domestic Science.*
Roger Bonner Mullen, *Galloway Cattle.*
Grover Poole, *Beef Problems on Kansas Farms.*
Abbie Elida Putnam, *Women as Primary Teachers.*
Harry Paul Richards, *Design of a 75 H.-P. (A. S. M. E. Standard) Horizontal Multitubular Boiler.*
Eva Talitha Rigg, *Action of Bacteria on Foods.*
John Francis Ross, *Farm Buildings for Kansas.*
Pontus Henry Ross, *Detection of Unsoundness and Vice in Horses.*
Fred Louis Schneider, *Foot-wear of the Horse.*
Edmund Ray Secrest, *Tree Planting in Semi-arid America.*
Glen Reid Shepherd, *Some Hysteresis Tests on Iron.*
Charles Franklin Smith, *Development of the Educational System in Kansas.*
Walter Hayward Spencer, *Prize Winning Shorthorns. How Bred and How Fed.*
John Thomas Stafford, *The Prairie-dog, and its Extermination in Kansas.*
Myrtie Lucy Toothaker, *Wordsworth, a Poet of Nature.*
Fred Walters, *The Percheron Horse.*
Lilly Maud Zimmerman, *Preservation of Food.*

GRADUATE.

George O. Greene, B. S. '00, *Problems in Orchard Pollination.*
Frank A. Hutto, B. S. '85, *Economic Growth and Civilization.*

The Live Stock Parade.

At two o'clock on the afternoon of Commencement day the Department of Animal Husbandry gave a public exhibition of the College live stock in front of the Main building. The procession was headed by the College band, playing its star march. The parade was a most interesting event. It showed that a fine beginning has been made in the collection of blooded stock. Forty-five animals were in line, representing ten different breeds. The value of the stock exhibited was about $10000.

The Sham Battle.

After a lawn concert by the College band, the cadets, under the command of Maj. Charles Eastman, gave a parade drill and sham battle on the east campus. There were several thousand visitors

assembled to view this spectacular drama. The cannons boomed, the small arms kept up a rattling fire from every clump of trees and bush, the signal trumpets blared, and the whole was a highly realistic picture of actual warfare, such as many of the veterens present had seen in the woods of the South, in Cuba or the Philippines.

Other Exhibitions.

Of other exhibitions that had been prepared for the closing exercises of the College year may be mentioned an exhibit of several hundred drawings of many kinds by the Department of Industrial Art. The drawings were pinned to the walls of Professor Walter's drafting room and presented a fine appearance. The collection of work was highly commented upon by visiting teachers and students and reflected credit on the department. The Mechanical Department had also prepared exhibits of student work, both in the carpenter shop and in the machine shop.

The Alumni Banquet.

The Alumni Association triennial banquet of the Kansas State Agricultural College was an occasion long to be remembered. It was the closing event of Commencement week. The president of the association, H. C. Rushmore, Vice-Pres. Mrs. R. J. Brock, Sec. C. Jeanette Perry, and the various committees let nothing pass that would add to the pleasure of the occasion. The reception that preceded the banquet gave those present an opportunity of renewing acquaintances. There were many there who had not met for years. A number were present from the early classes, as far back as 1872, and representatives from nearly every intervening class to that of the present, 1902. The first two classes, 1867 and 1871, were not represented. The drill hall in the Gymnasium was beautifully decorated with sunflowers, palms and red-white-and-blue bunting. Two-hundred twenty-five were seated at the banquet tables, and a fine menu was served.

During the banquet a delightful musical program was given by the mandolin club and the following toasts were given: "Agriculture," Isaac Jones, '94, Etiwanda, Cal.; "Technical Education and Industrial Progress," David G. Robertson, '86, Chicago, Ill.; "The Fads, Fallacies and Facts of Science," Prof. J. T. Willard, '84, Manhattan, Kan.; "The Lawyer's Relation to Society," W. E. Smith, '93, Kansas City, Mo.; "Scare Heads," P. S. Creager, '91,

Kansas City, Mo.; "Our Housewives," Mrs. Flora Donaldson-Reed, '81. We regret that we cannot publish these toasts in the present issue of the INDUSTRIALIST. Some of them will probably find room in the summer number. All of them were full of good cheer, good advice and wit. H. C. Rushmore, the president of the association, introduced the speakers in his inimical way.

The following original song, "The Happy Days of Old," was sung by the guests. The song was written by Emma E. Glossip, 83, and sung to the tune of "Auld Lang Syne:"

Fond recollection harkens back
To sunny days gone by,
To the kindly clasp of friendly hands,
The love-light in the eye.

CHORUS:

The happy days of old, my dear,
The happy days of old;
The skies were blue, the hearts were true,
In the happy days of old.

The home town on the river there,
The College on the hill;
The lanes and sheltered by-ways where
We wandered at our will.

Dear hearts that with us all the way,
In shadow or in light,
Have beat in youthful fellowship,
We greet you all to-night.

ALUMNI AND FORMER STUDENTS.

Dr. E. C. Joss, '96, has been elected instructor in veterinary science in the Washington Agricultural College and School of Science.

E. R. Secrest ['02] left Tuesday for Montana, where he takes up work in the division of forestry, bureau of agriculture.—*Nationalist.*

Claude Masters, '99, with J. A. Koller, has bought O. L. Hull's drug-store. This is the one formerly owned by Dr. Robinson, Manhattan.

Percy J. Parrott, so favorably known as assistant entomologist here for three years, has been appointed entomologist of the Ohio Agricultural Experiment Station.

Cards are out announcing the marriage of Miss Addie Hurlburt, second-year student, to Rev. F. P. Roby, of the Salina Wesleyan, at Sharon Springs, June 25.—*Nationalist.*

Jesse B. Norton, who has been for some time at Washington, D. C., in the department of agriculture, has been promoted to the place of assistant at a very good salary.—*Nationalist.*

Lucy Ward, second year student in 1894, and who since then has graduated at the State Normal School, visited College Commencement week. Miss Ward was an excellent student and all who know her hope that she will return and graduate.

H. B. Holroyd, student last year, has been appointed a student assistant in the bureau of forestry and will proceed to California to study the sugar pine with Mr. Grinnell. All will wish Mr. Holroyd success and hope that he may yet return and graduate.

Mr. and Mrs. R. H. Brown [both of '98] leave this week for Put in-bay, Ohio, to attend the annual convention of the Music Teachers' National Association, July 1 to 4. They will spend the summer in Chicago studying violin, piano and harp.—*Nationalist.*

Judge and Mrs. Geo. C. Wilder announce the engagement of their daughter, Adelaide Frances ['98], to Will M. Sawdon. Miss Wilder is a graduate and postgraduate of the Agricultural College and has been a teacher in the institution. Mr. Sawdon is a graduate of Purdue University and is now assistant in mechanical engineering at the College. The wedding will take place the second week in August.—*Mercury.*

Sergt. Robert Kimble [third year 1901], Troop I, Fourteenth Cavalry, passed through Kansas City last Friday on his way from Fort Grant, A. T., to Fort Totten, N. Y. Robert passed the examination for assignment to special duty in the school of electrical training at Fort Totten, connected with the submarine defense, and will be given six months' special training for the position of electrical sergeant. It is a splendid opportunity for the young soldier and his parents as well as the Manhattan friends feel very proud of his advancement. Judge Kimble feels specially proud of the fact that the boy stood fourth in the list of one hundred nineteen applicants for assignment to the July class of twenty.—*Mercury.*

The following item is taken from the *Farmers' Sentinel*, of Milwaukee, Wis., in which it is accompanied by an excellent likeness of Professor Davis: "Menomonie, Wis., June 21.—Prof. K. C. Davis, of Morgantown, W. Va., has been secured as principal and director of the new Dunn County Agricultural College, to be opened in this city next October. Professor Davis is a native of Kansas and a graduate of the Kansas State Normal School. He is also a graduate of the Kansas State Agricultural College and has taken the Ph. D. degree at Cornell University. Professor Davis taught science for several years in the high school at Austin, Minn., taught one year in the Minnesota State Normal School at St. Cloud, having charge of the biological science work, and for the past year has been at the head of the department of horticulture of the State University of West Virginia. Mrs. Davis is also a native of Kansas and a lady of culture, having graduated from

the same institutions of learning as her husband. She is a writer of recognized ability and has assisted her husband in preparing some valuable text-books on science. Professor and Mrs. Davis will reach Menomonie about July 1."

Friends of Wm. L. Hall, '98, will be interested to learn of his promotion to the office of chief of the division of forest extension in the bureau of forestry, United States department of agriculture. Mr. Hall was formerly assistant superintendent and later acting superintendent of the section of tree planting and mainly through his efforts the work has reached its present development. The many practical suggestions to be found in his bulletin entitled "Tree Planting on Rural School Grounds" has proved valuable to county superintendents and teachers all over the country. Ninety-five thousand copies have been issued, which exceeds the total number of bulletins published in the bureau of forestry during the past year. Mr. Hall entered upon his new duties July 1.—*Nationalist.*

The marriage of Emil Haggman and Miss Sadie Stingley youngest daughter of Mr. and Mrs. Harness Stingley, was solemnized Friday evening at the Presbyterian church in the presence of about one hundred friends of the contracting parties. Promptly at eight o'clock the wedding party, consisting of eleven couples, followed by the bride and groom, marched up the aisle to the strains of the Lohengrin wedding march, played by Mrs. E. J. Leicester. Upon arriving at the altar the bride and groom stood under an arch of asparagus, ferns and daisies, where by a brief ceremony introducing the ring service they were made husband and wife, Dr. John Hood officiating. "Annie Laurie" was played during the ceremony, followed by a selection from Tannhauser as the party marched out to the vestibule, where the happy couple received the congratulations of their friends. After spending a few days there with the groom's parents they will leave for Sherman, a suburb of Los Angeles, Cal., where Mr. Haggman is employed.—*Nationalist.*

Once in three years the College alumni meet and have a banquet. They compare notes on their experiences in life; smile at the old-time pranks, the school-day joys and heartaches, and the youthful hopes for the future; they take pride in describing in glowing terms or openly displaying their matrimonial acquisitions, and in condoling with the blindly unblessed. But more important than all is the revival of college spirit which the returned students experience. They realize, as they never did when they were in school, the worth of such an institution. Its needs appeal to them, and they are in position to act for its interests. That is why there is a strong feeling that the banquet—which is a drawing feature of any celebration—should be an annual affair; and that it should be free to all graduates, as is the case in almost all older institutions, the expense being met from the general fund. The College could not make a better investment than one that would bring a great body of students back here every year to go forth enthusiastic advertisers of their Alma Mater.—*Nationalist.*